

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

**RESPONSES
OF DIFFERENT COMMUNITY USER GROUPS
TO BIODIVERSITY CONSERVATION OF PROTECTED
AREAS IN LOWLAND FYNBOS – THE CASE OF THE
WOLFGAT NATURE RESERVE**

Thesis Presented for the Degree of
DOCTOR OF PHILOSOPHY
in the Department of Botany, Faculty of Science at the
UNIVERSITY OF CAPE TOWN

By

Theodore Llewellyn Manuel

March 2006

Supervisor
Prof. M.T. Hoffman

DECLARATION:

I, the undersigned, hereby declare that the work contained in this dissertation is my own original work and has not been previously in its entirety or in part been submitted at any university for a degree.

Signature:

Date: 15 March 2006

ABSTRACT

In South Africa the highly threatened status of imperiled lowland fynbos protected areas (PAs) have made conservation managers realize that getting local communities and user groups to beneficially use protected areas, involving them in protected area management in a manner that links with local socio-economic priorities is an alternative to the apartheid style exclusionary approach of conservation, and the only way of securing the future conservation of such areas. The largest nature reserve on the Cape Flats called Wolfgat Nature Reserve (WNR) is used as a case study to examine the potential for using this approach.

This thesis is based on a multidisciplinary investigation carried out between 1995-2005 involving four individual studies examining the responses of different community user groups to WNR biodiversity conservation. Using semi-structured questionnaires in a participatory social survey design, I conducted 601 personal interviews to determine the attitudes of the three main community groups to the current and future role of the WNR with respect to its use, its role in other socio-economic development themes, management practices, and user preferences and knowledge of the biota. The community groups are: firstly, residents ($n=200$) and community leaders ($n=100$) of the broader community of Mitchells Plain which surrounds WNR; secondly, the residents of the immediately adjacent, but culturally different surrounding communities of Tafelsig ($n=31$) in Mitchells Plain and Harare ($n=30$) in Khayelitsha; and thirdly the main users of the WNR comprising fisherfolk ($n=50$), teachers ($n=40$), secondary ($n=50$) and primary school ($n=100$) pupils. I conducted a fourth study to determine the responses of teachers to utilizing WNR for environmental education opportunities via 380 interactions. Using grounded theory, I analyzed two research processes namely: a workshop programme involving an action research process; and an interpretative process where I conducted interviews determine the responses of teachers to management approaches within the education and WNR conservation environment.

Data on the three main community user groups revealed that WNR provided few benefits and would not be used in its current state. Respondents in all four studies would use WNR at least once a month if it was upgraded with facilities such as an environmental or information centre. Teachers were particularly concerned about educational sites and proper pathways for people to walk on. Different user groups identified different priorities in using it non-consumptively. This ranged from using it for environmental education (residents of the broader Mitchell's Plain, of Tafelsig, teachers and pupils), recreation (community leaders and fisherfolk) and nature protection (residents of Harare). All user groups felt that it could be used consumptively for ecotourism. The fourth study on teachers revealed that teachers use WNR because they view it as an educational resource. The main barriers identified to using

WNR by the three community user groups were the perception of crime, pollution and the thick bush comprised primarily of alien plants. Solutions to these problems included the suggestion that volunteers from the communities be trained to patrol the area. This complements the need for education and job creation in both local communities of Mitchells Plain and Khayelitsha. Teachers identified the main challenges to implementing the educational use of WNR in local schools as logistical (large class numbers and support from external organizations) and contextual (i.e. positive involvement of senior staff at schools, addressing teacher development and confidence, and the provision of an in-service education and training programme (INSET)).

Responses from the leader and adjacent community studies indicate that the future of WNR conservation will be supported if it links with, and benefits the communities via, socio-economic priorities such as education (residents of the broader Mitchells Plain and Tafelsig) and job creation (community leaders and residents of Harare). User groups would benefit most if interpretive resources and user programmes are jointly developed with them and are user specific. All user groups had very low flora and fauna knowledge scores. Teachers felt that they could benefit if some of the following factors were addressed: planning; infrastructure development including the improvement of picnic sites and foot paths in WNR; curriculum-aligned learning resources; the promotion of activities in certain learning areas such as Science, Mathematics and Social Sciences; the use of active learning pedagogies, and supportive processes such as assistance to understand educational change processes in the context of a PA such as WNR.

I suggest that it is possible to have local communities and user groups benefiting from and participating in the sustainable management of an urban reserve such as WNR. However, participation should start with the establishment of a sectorally representative action committee which includes stakeholder groups such as business, women, youth groups and other resource user groups (e.g. herbalists). The work of such a group should be based on two important principles: that the conservation of WNR should involve community outreach such as environmental education programmes beyond its boundaries, and job creation within its boundaries, for the benefit of local communities; and that all agreements should be collectively negotiated and enforced. Particular attention should be paid to employing staff from the local communities to accommodate the language, experiential and cultural differences of the immediately adjacent Tafelsig and Harare communities in visitation and user programmes. In education, teachers need to contend with the least amount of barriers. WNR should be introduced to teachers in a manner that meets their immediate needs. Teachers should be involved in all educational planning processes, especially any INSET programme relating to WNR.

Acknowledgements

This thesis was not the work of the author alone, but also that of the many individuals who have contributed to the context and content. I gratefully acknowledge the following people below.

Firstly, I thank my supervisor Prof. M.Timm Hoffman for having the faith in me and accepting to serve as my supervisor.

Secondly, I wish to thank all the respondents who gave of their time to participate in the research process. I thank all the residents and community leaders of Mitchells Plain, residents of Tafelsig and Khayelitsha, fisherfolk, teachers and school pupils whom I interacted with on this research journey. Without you, it would not have been possible.

I thank the following people who have guided and influenced my work: Dr. Clive McDowell; Prof. Richard Cowling; Prof. Danie Schreuder, Prof. Bruce McKenzie; Dr. Fareeda Khan; Dr. Kevin Winter; Prof. Heila Lotz; Dr. Guy Preston. A special thanks to Dr. Chris Reddy who provided valuable insight and comments on the educational aspects of the thesis.

Colleagues and friends who provided support during the research: The scribes who assisted, namely: Gladys Barker; Tanzil Abrahams; and Noëline Daniels. Teachers who became friends such as Tyron Humphries; Dawood Tregonning; Pam Snyders; Sharon Sias; Jennifer Orian; Jackie Classen; Donovan Fullard; staff of Searidge Park Primary; staff of Huguenot Primary; and staff of Westville Primary. I also thank Fadli Wagiet and Glen van Harte of the Department of Education for all your support. Thanks to Margaret Sandworth for invaluable library assistance. To Roland Johannissen for taking photographs. Thank you to Nikki Oliver for compilation of the maps and diagrams, and all at the IPC, UCT and the Working for Water Programme. To support from the Malanders, Pierreene, Eugen, Mario, David and Dominique.

I am particularly grateful for the financial assistance from Mrs Yach, of the Solm Yach Fellowship, Mauerberger Foundation and Linda Vranas of the University of Cape Town post-graduate scholarships without which I would not have been able to undertake this research.

I owe a profound debt to my family for all the emotional and other practical forms of support that was critical during the research and writing phases. To my grandmother Caroline and grandfather Peter, my mother Leonie, father Kevin, aunts Elizabeth, Norma, Mercia, uncles Desmond, Clarence and Lorenzo, brothers Roneldo and Jerome, sister Carenza and her family; all others in our family, thank you for your support and confidence in me.

TABLE OF CONTENTS

Declaration	i
Abstract	ii
Acknowledgements	iv
Table of Contents	v
List of figures	xiii
List of Tables	xiv
List of Appendices and boxes	xvi
Illustrations	xviii
CHAPTER 1: INTRODUCTION AND BACKGROUND	1
1.1. The research setting	1
1.2. Fynbos lowlands and surrounding Cape Flats communities	2
1.3. Response of the Fynbos conservation community:- C.A.P.E.	3
1.4. Educational change in the post apartheid South Africa	4
1.5. Conceptual framework for this study	5
1.6. Rationale for the research project	7
1.7. Dissertation style, presentation and chapter outline	8
CHAPTER 2: THE STUDY AREA	10
2.1. Introduction	10
2.2. The Study Area	10
2.3. Management and socio-economic environment	13
2.4. Concluding comments	17
CHAPTER 3: A CONTEXT OF BIODIVERSITY CONSERVATION AND EDUCATIONAL CHANGE ALONGSIDE PROTECTED AREAS: BACKGROUND AND CONTEXT OF THE RESEARCH PROCESS	18
3.1. Introduction	18
3.2. The Participation Story in Biodiversity Conservation	19
3.2.1. From local community exclusion to local community participation	19
3.2.2. A brief summary of the world's protected areas	21
3.2.3. Clarifying community conservation	21

3.2.4.	Community conservation in Africa	24
3.2.5.	Community conservation in South Africa	24
3.2.6.	Urban community conservation and the participation gap in Lowland fynbos conservation	27
3.2.7.	Critical issues in determining support for community conservation	33
3.2.7.1.	Providing tangible resource-use benefits to local communities	33
3.2.7.2.	The role of Protected Areas (PAs) in supporting social and economic development	35
3.2.7.3.	Improving relations between Protected Areas and communities	35
3.2.7.4.	Understanding the factors that lead to public support of Protected Areas	36
3.2.7.5.	The importance of user participation and knowledge for the conservation of Protected Areas	37
3.3.	The Role of Environmental Education in enhancing teacher participation in Community Conservation	38
3.3.1.	The role of environmental education in responding to the global environmental crisis	38
3.3.2.	Defining Environmental Education	40
3.3.3.	The use of Protected Areas for Environmental Education	40
3.3.4.	South African macro-educational environment prior to 1994	42
3.3.5.	South African macro-educational environment after 1994	44
3.3.6.	The importance of socially-critical environmental education in the South African educational environment after 1994	45
3.4.	Concluding Comments	47
CHAPTER 4: RESEARCH METHODOLOGY		48
4.1.	Introduction	48
4.2.	Methodology for the Social Survey component	49
4.2.1.	Survey design	49
4.2.2.	Interviews with residents and community leaders	51
4.2.3.	Interviews with user groups: fisherfolk, teachers and pupils	53
4.2.4.	Questionnaire design	54
4.2.4.1.	Questionnaire for residents and community leader	54
4.2.4.2.	Other issues relating to the questionnaire	55
4.2.4.3.	Questionnaires for the user groups	56
4.2.5.	Statistical methods and data analysis	59

4.2.6.	Pilot studies	60
4.3.	Process and methodology for the Education component	60
4.3.1.	Providing a guiding framework for a participatory and enabling orientation	60
4.3.2	Methods and data collection techniques	64
4.3.2.1.	Methods	64
4.3.2.2.	Data collection techniques	66
4.3.3.	Data Analysis	69
4.3.3.1.	Collaborative participation in data analysis	69
4.3.3.2.	Data analysis process	70
4.3.3.3.	Using case records to organize the data	71
4.3.3.4.	Interpretation and Data analysis	71
4.3.3.5.	Triangulation	73
4.3.4.	Validity, rigour and ethics	73
4.4.	A Note on Data Management	75
4.5.1.	Concluding comments	76

CHAPTER 5: COMMUNITY CONSERVATION AND ENVIRONMENTAL EDUCATION RESEARCH DATA

CHAPTER 5.1: Introduction

CHAPTER 5.2: ATTITUDES OF RESIDENTS AND COMMUNITY LEADERS OF THE SURROUNDING MITCHELLS PLAIN COMMUNITY TO THE CURRENT AND FUTURE ROLE OF WOLFGAT NATURE RESERVE

1.	Introduction	79
2.	Methods	79
2.1	Study context and data analysis	79
3.	Results	80
3.1.	Socio-economic features of residents and community leaders	80
3.2.	Current and future role of the reserve	81
3.2.1.	Current role if not upgraded	81
3.2.1.1	Frequency of present use	81
3.2.1.2	Reasons for staying away	83
3.2.1.3.	Factors influencing perceived threats to the utilization of WNR in its current state	84
3.2.2.	Potential future role if upgraded	85
3.2.2.1.	Frequency of future use	85

3.2.2.2 .	Perceived utilization if upgraded	87
3.2.2.3.	Facilities to be developed and how they would benefit the community?	88
3.2.2.4 .	Factors to be monitored in future to encourage ongoing usage	88
3.2.2.5.	Factors influencing perceived utilization practices in WNR if upgraded	89
3.3.	Prioritization and the role of Wolfgat in relation to local community development themes and factors influencing funding towards its conservation	90
3.3.1.	Prioritization of WNR	
3.3.1.1.	When allocating R1million towards community development themes	90
3.3.1.2.	When ranking the area in relation to other community development themes	92
3.3.2.	With which community priorities could Wolfgat help and how could it help?	92
3.3.3.	Factors influencing funding towards its conservation	93
3.4.	Crucial conservation and management issues	95
3.4.1.	Attitudes to WNR conservation	95
3.4.2.	Perceptions of the management authority	96
3.4.3.	Community involvement in management	98
4.	Discussion	99
4.1.	The role of the reserve	99
4.1.1	Current use and factors that affect its use	99
4.1.2	Future use and factors that affect its use, if upgraded	101
4.2.	Prioritisation of, and the role of Wolfgat in relation to other socio-economic development themes	105
4.2.1	Allocation of funding and the ranking of community development options with Wolfgat as part of the options	105
4.2.2	Community priorities with which Wolfgat could help	106
4.2.3	Factors influencing funding towards conservation of WNR	107
4.3.	Crucial conservation and management issues	108
4.3.1.	Attitudes to support its conservation	108
4.3.2.	Perceptions of the management authority	108
4.3.3.	Community involvement in Wolfgat management	110
5.	Concluding comments	111

CHAPTER 5.3: ATTITUDES OF ADJACENT, CULTURALLY DIFFERENT COMMUNITIES TO THE CURRENT AND FUTURE ROLE OF WOLFGAT NATURE RESERVE

1.	Introduction	113
----	--------------	-----

2.	Methods	114
2.1	Study context and data analysis	114
3.	Results	114
3.1.	Socio-economic features of the two adjacent communities	114
3.2.	The current and future role of the reserve	116
3.2.1.	Current role if not upgraded	116
3.2.1.1	Frequency of present use	116
3.2.1.2	Reasons for staying away	116
3.2.1.3.	Factors influencing perceived threats to the utilization of WNR in its current state	118
3.2.2.	Potential future role if upgraded	120
3.2.2.1.	Frequency of future use	120
3.2.2.2	Perceived utilization if upgraded	120
3.2.2.3.	Facilities to be developed and how they would benefit the community?	122
3.2.2.4.	Factors influencing perceived utilization practices in WNR if upgraded	123
3.4.	Prioritization and the role of Wolfgat in relation to local community development themes and factors influencing funding towards its conservation	124
3.3.1.	Prioritization of WNR	124
3.3.1.1	When allocating R1million towards community development themes	124
3.3.2.	The role of Wolfgat in relation to other community development themes	126
3.3.3.	Factors influencing funding towards its conservation	127
3.4.	Crucial conservation and management issues	128
3.4.1.	Attitudes to WNR conservation	128
3.4.2.	Perceptions of the management authority	129
3.4.3.	Community involvement in management	130
4.	Discussion	131
4.1.	The role of the reserve	131
4.1.1	Current levels of use and factors that affect it	131
4.1.2.	Future levels and types of use, if upgraded	134
4.2.	Prioritisation of, and the role of Wolfgat in relation to other socio-economic development themes	138
4.2.1.	Allocation of funding, the ranking of community development options with Wolfgat as part of the options and how WNR can benefit the community	138
4.2.2	Factors influencing funding towards conservation of WNR	140
4.3.	Crucial conservation and management issues	141

4.3.1. Attitudes to support its conservation	141
4.3.2. Perceptions of the management authority	141
4.3.3. Community involvement in Wolfgat management	143
5. Concluding comments	144

CHAPTER 5.4: USAGE, PREFERENCES, PERCEPTIONS AND KNOWLEDGE OF FOUR USER GROUPS OF THE WOLFGAT NATURE RESERVE

1. Introduction	147
2. Methods	148
2.1 Study context and data analysis	148
3. Results	148
3.1 Profile of user groups	148
3.2 Usage	149
3.2.1 Usage patterns	149
3.2.2. Other reasons for using WNR and enjoying their visit	150
3.2.3. Usage per group	150
3.2.3.1. Fisherfolk	150
3.2.3.2. Teachers	153
3.2.3.3. Secondary and primary school pupils	154
3.2.4. Factors that influenced visitation to WNR	155
3.3. Preferences	156
3.3.1 Interpretation information and visitation programme	156
3.3.2 Land-use	159
3.4 Perceptions	161
3.4.1 Perceived value of WNR	161
3.4.2 Perceived threats	161
3.5 Understanding of the term “conservation” and knowledge of the flora and fauna	164
3.5.1. The term “conservation”	164
3.5.2. Knowledge of the flora and fauna	165
4. Discussion	169
4.1. Usage	169
4.2. Preferences	174
4.3 Perceptions	175
4.4 Understanding of the term conservation and knowledge of the flora and fauna	177
5. Concluding comments	179

CHAPTER 5.5: RESPONSES OF TEACHERS TO USING WOLFGAT NATURE RESERVE FOR ENVIRONMENTAL EDUCATION

1.	Introduction	181
2.	Methods	182
3.	Results	182
3.1.	Themes which emerged from the workshops, reflective interviews and data generated through the grounded theory process	182
3.2.	The main theme: Teachers use WNR because it has educational value as a resource	182
3.2.1.	Why teachers use WNR	182
3.2.2.	How teachers can use WNR	183
3.2.3.	Challenges to implementing environmental education use of WNR in local schools	190
3.2.3.1.	Contextual challenges	190
3.2.3.2.	Logistical challenges	195
3.2.3.3.	Key factors which allowed teachers to overcome implementation challenges when using WNR	195
3.3.	The identification of supportive processes to use WNR	196
3.3.1.	Teachers' participation in curriculum and resource development	196
3.3.2.	The need to manage educational change in the ongoing use of WNR: Teachers' views from workshop discussions and interviews in the period August 2001 to May 2002	198
3.3.3.	Management actions needed to create an enabling environment to use WNR	199
3.3.3.1.	Educational Management responses to using WNR: Interview with a chief curriculum advisor of the Education Department	199
3.3.3.2.	Reserve Management responses to using WNR: Interview with the WNR manager of the managing authority	200
3.3.3.	The ongoing need to examine if the educational use of WNR by teachers is sustainable under current conditions	200
4.	Discussion	
4.1.	Teachers' use of the reserve for environmental education	203
4.1.1.	Why use WNR?	203
4.1.2.	How could WNR be used?	204
4.1.3.	Challenges teachers experienced to using WNR in their practice	208
4.2.	Support processes needed to use WNR	210
5.	Concluding comments	213

CHAPTER 6: CONCLUDING COMMENTS AND POSSIBILITIES FOR FURTHER RESEARCH

6.1.	Introduction	215
6.2.	Key Findings	216
6.2.1	Responses of residents and community leaders to the current and future role of WNR	216
6.2.2.	Responses of adjacent, culturally different communities to the current and future role of WNR	220
6.2.3.	Responses of four user groups relating to their usage, preferences, perceptions and knowledge of WNR	225
6.2.4.	Responses of teachers to utilizing the WNR for environmental education	229
6.3.	Implications for community participation in biodiversity conservation and reserve management	232
6.4.	Implications for the work of the Cape Flats Nature (CFN) project	234
6.5.	Implications for local educational policies and practices related to lowland fynbos reserves	236
6.6.	Concluding comments	238
6.7.	Possibilities for further research	240
6.8.	Reflections on the research process	242
6.8.1.	Limitations of the research	242
6.8.2.	Value of the research project	243
6.8.3.	Personal reflections	244
	REFERENCES	245
	APPENDICES	270

LIST OF FIGURES

Figure 1.1. Theoretical framework for community-based participation in lowland fynbos conservation	6
Figure 2.1. Location of the Wolfgat Nature Reserve	11
Figure 5.2.1. Perceived frequency of use of residents and community leaders for the Wolfgat Nature Reserve in its current non-upgraded state	82
Figure 5.2.2. Perceived frequency of use of residents and community leaders for the Wolfgat Nature Reserve should it be upgraded	86
Figure 5.3.1. Perceived frequency of use of Tafelsig and Harare residents for the Wolfgat Nature Reserve in its current non-upgraded state	116
Figure 5.3.2. Perceived frequency of use of Tafelsig and Harare residents for the Wolfgat Nature Reserve should it be upgraded	120
Figure 5.4.1. Percentage responses as to how information that is to be developed, is to be presented	157
Figure 5.4.2. Percentage response to the question “Other than your use, what other use should WNR be put to?”	160
Figure 5.4.3. Percentage responses for each user group to the question “what do Understand by the term “conservation?”	164
Figure 5.4.4. Percentage respondents correctly classifying the flora by taxa	165
Figure 5.4.5. Percentage respondents correctly classifying the fauna by taxa	166
Figure 5.5.1. Graphical representation of why teachers use WNR, the associated challenges and the supportive processes identified by teachers to use WNR	183
Figure 5.5.3. Teachers’ evaluation of how the current use of WNR relates to the Implementation of the Outcomes-based policy (of the Education Department) at national and provincial level	202

LIST OF TABLES

Table 3.1. Comparison between fortress conservation and different approaches to community conservation	23
Table 4.1. Sample of 200 residents drawn from the Mitchells Plain population	50
Table 4.2. Summary of activities with Primary and Secondary school teachers	64
Table 5.2.1. Summary of key socio-economic features from this study of residents and community leaders of the Mitchells Plain community	80
Table 5.2.2. The rank order of importance of six factors that currently prevent residents and community leaders from using the Wolfgat Nature Reserve (WNR)	83
Table 5.2.3. Results of chi-squared tests for seven factors associated with why residents and community leaders are staying away from using the WNR	84
Table 5.2.4. The rank order of importance of five non-consumptive uses if Wolfgat were upgraded should residents and community leaders plan developments	87
Table 5.2.5. The rank order of importance of eight consumptive uses if Wolfgat were upgraded should residents and community leaders plan developments	88
Table 5.2.6. Results of chi-squared tests for eight socio-economic factors associated with perceived utilization of WNR upgraded, by residents & community leaders	89
Table 5.2.7. Proposed average allocation per 14 community development options from a total of R1 million prioritized by residents and community leaders	91
Table 5.2.8. The rank order of importance of four development options in which residents and community leaders see Wolfgat playing a role	93
Table 5.2.9. Results of chi-squared tests for six socio-economic factors associated with allocations of community development funds and own personal funds towards Wolfgat conservation	94
Table 5.2.10. Statements used to determine attitudes toward conservation of WNR between residents and community leaders	96
Table 5.3.1. Summary of key socio-economic features from this study of Tafelsig and Harare sample communities which lies adjacent to WNR	115
Table 5.3.2. The rank order of importance of six factors that currently prevent Tafelsig and Harare residents from using the Wolfgat Nature Reserve (WNR)	117
Table 5.3.3. Results of chi-squared tests for seven factors associated with why Tafelsig and Harare residents are staying away from using the WNR	118
Table 5.3.4. The rank order of importance of five non-consumptive uses if Wolfgat were upgraded should Tafelsig and Harare residents plan developments	121
Table 5.3.5. The rank order of importance of ten consumptive uses if Wolfgat were upgraded should Tafelsig and Harare residents plan developments	122
Table 5.3.6. Results of chi-squared tests for five socio-economic factors associated	

with perceived utilization of WNR upgraded, by Tafelsig and Harare residents	123
Table 5.3.7. Proposed average allocation per 13 community development options from a total of R1 million prioritized by Tafelsig and Harare residents	125
Table 5.3.8. The rank order of importance of nine development options in which Tafelsig and Harare residents see Wolfgat playing a role	126
Table 5.3.9. Results of chi-squared tests for three socio-economic factors associated with allocations of community development funds and own personal funds towards Wolfgat conservation	127
Table 5.3.10. Statements used to determine attitudes toward conservation of WNR between Tafelsig and Harare residents	129
Table 5.4.1. Usage patterns for each user group when using WNR	149
Table 5.4.2. Fishing patterns of fisherfolk over the period November 1995 to October 1996	150
Table 5.4.3. Statements used to formulate an index of attitudes of fisherfolk towards their fishing practice	151
Table 5.4.4. Results of chi-squared tests for three socio-economic factors associated with attitudes to fishing practices of fisherfolk	152
Table 5.4.5. Percentage responses of teachers to their current subject use in WNR, perceived future use and resource requirements	153
Table 5.4.6. Percentage response to subject, project and resource preferences of secondary and primary school pupils to environmental education activities in the WNR	154
Table 5.4.7. The rank order of user preference of the type of information that needs to be developed, as part of an interpretation programme	156
Table 5.4.8. The rank order of user preference of the type of visitation programme that needs to be developed, as part of an interpretation programme	158
Table 5.4.9. The rank order of land use preference for the four types of user groups	159
Table 5.4.10. The rank order of perceived value of WNR, for the four types of user groups	162
Table 5.4.11. The rank order of perceived threats to WNR, for four types of user groups	163
Table 5.4.12. Relationship between socio-economic characteristics of the four user groups and aggregate flora knowledge, calculated as the sum of the mean family, genus and species scores	167
Table 5.4.13. Relationship between socio-economic characteristics of the four user groups and aggregate fauna knowledge, calculated as the sum of the mean family, genus and species scores	168
Table 5.5.2. Attributes such as sites, plants and animals identified of educational value in how WNR can be used	184

APPENDICES

APPENDIX 1. Universe for Community Leader.	270
APPENDIX 2. Letter sent to community leaders requesting their participation in the Survey	272
APPENDIX 3: Example of a graphical set of cards used by the researcher during the interview process during the community surveys.	273
APPENDIX 4. Community survey questionnaire.	274
APPENDIX 5. User survey questionnaire.	285
APPENDIX 6. Protocol of questions that were used for the individual teacher interviews	293
APPENDIX 7. Protocol of questions that were used for the teacher focus group interviews	294
APPENDIX 8: Answers to Qualitative Questions posed to further clarify answers in Section B, "The utilization of Wolfgat Nature Reserve".	295
APPENDIX 9: Reactions of residents and community leaders to ranking eight out of thirteen community development options, when allocating R1million for community development	297
APPENDIX 10: Answers to Qualitative Questions posed to further clarify answers in Section D of the Questionnaire : It refers to attitudes toward the conservation of Wolfgat in relation to the socio-economic development themes of the surrounding Mitchells Plain community.	298
APPENDIX 11: Answers questions posed Section E of the questionnaire which refers to co-operation and communication which could influence the future of Wolfgat	299
APPENDIX 12: Answers questions posed Section E of the questionnaire which refers to co-operation and communication which could influence the future of Wolfgat	300
APPENDIX 13: Answers to Qualitative Questions posed to further clarify answers in Section B of the Questionnaire, which refers to utilization of the reserve under two management scenarios: Wolfgat remains as it is versus Wolfgat upgraded.	301
APPENDIX 14: Answers to questions posed in Section E of the questionnaire which refers to co-operation and communication which could influence Wolfgat's future.	302
APPENDIX 15. Usage patters of four user groups. Answers related to "why they visit WNR" and 'why they enjoy visiting WNR".	303
APPENDIX 16: Answers relating to usage patterns of four user groups. Answers related specifically to factors which influence the visitation of the four user groups to WNR.	304
APPENDIX 17: Answers relating to preference of consumptive versus non-consumptive	

land-use practices in the WNR.	305
APPENDIX 18: Answers relating to perceptions of four user groups. Answers related specifically to factors which influence the perceptions of four user groups to factors which threaten the conservation of the area.	306
APPENDIX 19. Introduction worksheet developed by teachers for use in WNR.	307
APPENDIX 20. Pollution Learning Programme with litter data sheet developed by teachers for use in WNR.	308
APPENDIX 21. Using the WNR to do the alien plant vegetation audit: Active learning story of Westville Primary who did a long-term school-in-community monitoring study.	310
APPENDIX 22. Alien vegetation learning programme developed by teachers for use in WNR. A guide for teachers and an activity sheet for the pupils developed by teachers for use in WNR.	312
APPENDIX 23. Illustrative example of how teachers identified relevant examples to use in the Primary school Natural Science syllabus in the Senior Primary/Intermediate phase of Learning, when using WNR.	316

BOXES

Box 5.5.1. Using the WNR to do the pollution audit: Stories of Active Learning and pupil participation	187
--	-----

ILLUSTRATIONS

The front page of each chapter has been illustrated with scenes from various contexts of the project. In most cases, it is used to contextualize the chapter. The pictures are as follows:

Chapter 1: Introduction and background

Site visit undertaken by residents and community leaders of the Mitchells Plain community and Wolfgat managers during October 1994 when pilot studies were undertaken by the researcher.

Chapter 2: The Study Area

Aerial view showing Wolfgat Nature Reserve along the False Bay coast (courtesy, City of Cape Town).

Chapter 3: Biodiversity conservation and educational change alongside protected areas:

Background and context of the research process.

Floral diversity in Wolfgat Nature Reserve during spring

Chapter 4: Research Methodology

Sandy shore in Wolfgat with sensitive limestone cliffs which provide the only mainland breeding site for the Kelp Gull (*Larus dominicanus*) in South Africa.

Chapter 5: Community conservation and Environmental Education Research Data

Chapter 5.1: Introduction

Photograph taken from within Wolfgat showing Huguenot Primary School on its border and the vast urban development in the Tafelsig suburb of the Mitchells Plain community.

Chapter 5.2: Attitudes of residents and community leaders of the surrounding Mitchells Plain community to the current and future role of Wolfgat Nature Reserve

Various aspects which affect the conservation of Wolfgat. A) Housing developed right up against the border of Wolfgat with no buffer or transition zone; B) Various articles which appeared in the local community newspapers in the Mitchells Plain community which raised awareness about Wolfgat, especially around educational activities; C) Wolfgat is considered as an important part of the urban renewal programme in Mitchells Plain.

Chapter 5.3: Attitudes of adjacent, culturally different communities to the current and future role of Wolfgat Nature Reserve

Illustrations of the different socio-economic conditions in the suburb of Tafelsig (A) in Mitchells Plain which had more formal housing and the Harare suburb (B) in Khayelitsha, where informal housing dominated. Conditions inside the houses also shown for Tafelsig (C) and Harare (D).

Chapter 5.4: Usage, preferences, perceptions and knowledge of four user groups of the Wolfgat Nature Reserve.

Activities of fisherfolk (A) and teachers with their pupils during a plant identification environmental educational activity in Wolfgat.

Chapter 5.5: Responses of teachers to using Wolfgat Nature Reserve for environmental purposes.

Teachers using Wolfgat for various environmental educational activities during this project.

(A) Teachers on a site visit in Wolfgat during the initial workshop in this project testing soil pH; (B) Teachers and pupils conducting a pollution audit in a pollution plot near the beach; (C) Teacher and pupils conducting an alien vegetation audit in Wolfgat.

Chapter 6: Concluding comments and possibilities for further research.

Housing slowly encroaching onto Wolfgat from Tafelsig where houses have been built on the Wolfgat boundary (A). Photograph taken from Wolfgat showing encroaching informal housing from the suburb of Harare, now less than 2 km from Wolfgat. Photographs taken in February 2006.

References:

Baden Powell Drive, a main road which traverses Wolfgat poses a serious threat to the limestone cliffs.

Appendices:

The future of Wolfgat now depends on the beneficial involvement and participation of the local communities and users in the ongoing management of Wolfgat

CHAPTER 1

INTRODUCTION AND BACKGROUND



CHAPTER 1

INTRODUCTION AND BACKGROUND

1.1. The research setting

This research explores local community participation in lowland fynbos biodiversity conservation and investigates the responses of teachers to using a lowlands protected area (PA) called Wolfgat Nature Reserve (WNR). The work was conducted between 1995-1997, a period of dramatic political and educational change and tension after the demise of apartheid in 1994. A post-intervention study to reflect on participation at local schools was also carried out in the period 2001-2002 with a sub-sample of the initial teachers.

Under apartheid and its authoritarian conservation policies, (black) local communities were deliberately excluded from visiting, using or benefiting from PAs (Picard, 2003). They were also largely excluded from making decisions about these PAs (Cock and Fig, 2000). This not only alienated them, but also led to misunderstanding, conflict and distrust (Carruthers, 1989; Ellis, 1994). This situation was mirrored in education where I as a black secondary school teacher often distrusted “the system” and was constantly in conflict when teaching Biology lessons from a textbook, using examples which I identified as having no relevance to the natural environment wherein learners found themselves.

Following the demise of apartheid in South Africa and the dawn of a new era of democracy, local communities in the fynbos lowlands now looked to these areas for benefits, including many landless and jobless people who wanted these areas to provide them with housing as well as an income. Conservation managers started to recognize that politically and ethically, the long-term management of these PAs would only be successful if they introduced integrated conservation and community development projects where there is co-operation and support of local people (Wells, et al., 1992; Wells, 1996). The new national constitution declared that conservation and sustainable development would be simultaneously pursued to promote the economic and social development of previously disadvantaged communities (Constitution of the Republic of South Africa, 1996). However, it also recognized that educational reform would be important in achieving sustainable development and in improving community life. Fynbos conservation managers also recognized that the stabilization of land use in these PAs can be achieved by using PAs for conservation (environmental) education (Wells, 1996).

In a historically disadvantaged area 30 km from the centre of Cape Town, this tension between community needs and the need to conserve a lowland fynbos area called the Wolfgat Nature Reserve (WNR) was also growing. It resulted in David Daitz (then Director of Parks and Forests, City of Cape Town) (City of Cape Town, 2001), saying that “I can see the need to conserve this area (WNR), but it can only survive if it gains the wholehearted support of the surrounding communities”. An urgent need thus arose to exemplify broad-based community participation and support for the conservation of such a lowland fynbos area. This was to take place, however, in a community setting of people who were forcibly moved by the apartheid regime in the late 1970’s and 1980’s to live adjacent to this area. In addition, educators of surrounding community schools who identified this area’s educational potential, came from an education system where most were pedagogically poorly-equipped to interact with the lowland fynbos natural environment.

1.2. Fynbos lowlands and surrounding Cape Flats communities

Protected areas have been recognized as the single most important tool for addressing the conservation of biodiversity in the 87 892 km² Cape Floristic Region (CFR) (Cowling et al., 2003), a global biodiversity hotspot and Centre of Plant Diversity (Mittermeier et al., 1998; Myers et al., 2000). The CFR has approximately 9600 species of indigenous plants, of which 70% are endemic and 1406 are listed in the *Red Data Book* (Hilton-Taylor, 1996). The CFR has the highest known diversity of plant species in the world, namely, 1300 species per 10 000m² (Stanvliet et al., 2005). A major centre of diversity and endemism in the CFR is the metropolitan area of the City of Cape Town called the Cape Metropolitan area (CMA). It is home to about 3.5 million people. The CMA is divided into the Cape Peninsula Mountain Chain (2585 plant species in 471 km², of which 90 species are endemic) and the Lowlands (1466 plant species in 1874km², of which 76 are endemic and 131 are *Red Data Book* species), also known as the Cape Flats (Maze et al., 2002). The conservation of biodiversity on the Cape Flats has become critical. Some lowland habitats have been reduced by over 90%, and less than 5% enjoys any conservation status at all (Rouget et al., 2003). In the 1980’s, most lowland reserves were proclaimed on an *ad-hoc* basis. They were designated as areas for conservation and recreation (City Engineer’s Department, 1982) without prioritizing their contribution to pre-determined conservation targets (Maze et al., 2002) or involving local communities. In the early 1990’s, only 1% of sand plain fynbos and 32% of strandveld remained in the CMA (McDowell and Low, 1991) which when compared to the IUCN’s goal of conserving 10% of every vegetation type, represents one of the most significant losses of biodiversity (Maze and Rebelo, 1999). Together with the threat of invading alien plants, rapid urbanization exerted increasing pressure on these lowland habitats (Wood et al., 1994; Rouget et al., 2003).

Based on preliminary studies in the 1990's (Low, 1991; McDowell et al., 1991; McKenzie and Rebelo, 1997) which examined the conservation of plant habitat remnants on the Cape Flats, Maze and Rebelo (1999) developed a strategic urban conservation plan which identified 38 formally proclaimed PAs. These were the minimum set of areas to conserve a maximum (97%) of all lowland plant species. Initial studies showed that residents and users wanted two of the 38 areas such as Driftsands Nature Reserve (Nguta, 1992) and Wolfgat Nature Reserve (Khan, 1994) retained as nature reserves. The youth, in particular, identified consumptive and non-consumptive values for fynbos (Le Maitre et al., 1997). More recently, other authors involved in urban fynbos conservation (Davis, 2005; Stanvliet et al., 2004) have also recognised that the community-engagement process is the key to protecting the Cape Flats biodiversity and empowering its people. However, despite these initial investigations and more recent initiatives, there remains a gap in our knowledge of the attitudes and perceptions of local communities to the beneficial role of these areas and how community user groups would like to interact with them.

The CMA is an area of great social contrasts. The mountain chain is home to some of the city's wealthiest residents. It is managed well in that 73% of the region falls into a statutory protected area called the Cape Peninsula National Park. This park enjoys generous international (Global Environmental Facility) and local funding (e.g. *The Working for Water Programme*) (Van Wilgen et al., 1998). In contrast, the Cape Flats is home to the impoverished majority of the CMA's residents. Most of the people living on the Cape Flats today were forcibly removed in the late 1960's and 1970's due to the pre-1994 apartheid policy of the previous government. However, many people have also migrated to the Cape Flats from other parts of South Africa since the lifting of influx controls in the mid-1980's. This has resulted in many urban (black) residents of different cultural and ethnic origins, living in crime-ridden settlements called townships, adjacent to these 38 formally-proclaimed PAs.

1.3. Response of the Fynbos conservation community:- C.A.P.E.

A project known as the Cape Action Plan for People and the Environment (C.A.P.E.) (Cowling and Pressey, 2003) was launched in 1998 with its main aim to "effectively conserve the natural environment and biodiversity of the fynbos region and deliver significant benefits to the people of the region in a way that is embraced by local communities, and endorsed by government and recognised internationally" (Lochner et al., 2003). C.A.P.E. had three key goals: (1) the protection of biodiversity in priority areas; (2) the promotion of sustainable use of biodiversity; and (3) the strengthening of institutions, and the promotion of co-operative governance and community involvement in conservation. Despite its great scientific and

technical outputs, a crucial weakness of C.A.P.E. was its failure to consult local communities surrounding protected areas (Gelderbloem et al., 2003) so as to provide clear priorities to guide management strategies on how to conserve lowland fynbos protected areas.

Currently, CAPE is involved in a project called the Cape Flats Nature (CFN) project. Initiated in 2002, it is a six-year pilot project involving four of the 38 conservation areas. One of the areas is Wolfgat Nature Reserve (WNR), the subject of this study. The CFN project falls under an umbrella project of the local authority of the City of Cape Town called the *Biodiversity Mainstreaming Project* (City of Cape Town, 2003). The main aim of CFN is to build good practice in sustainable management of the City's urban conservation sites in a way that benefits poor communities surrounding these sites. It recognizes that changing community attitudes are essential if these areas are to be conserved. Despite CFN's aims, at no site has a broad-based consultative approach with a cross section of different community groups been undertaken. To date, an evaluation report on CFN indicates that the use of the region remains largely unexplored (Saol and van Blerk, 2005). In addition, educators at surrounding schools still grapple with the integration of these areas into educational curricula.

1.4. Educational change in the post apartheid South Africa

With political transformation to one democratic society also came the transformation from an ethnically-differentiated education system to a single restructured education system, strongly driven by new policies to guide the educational reform process (Pape, 1998). The South African government introduced a national policy focused on an outcomes-based education and training (OBET) discourse (Reddy, 2001; Wilmot, 2004), which was aimed at transforming education at systemic, social and methodological levels (Lotz and Oliver, 1998). This type of educational policy Lotz and Oliver (1998) contends is more responsive to local needs and socio-economic development. The new outcomes-based curriculum, referred to as Curriculum 2005, was described by the first national Minister of Education, Professor Bengu in an official policy document (Department of Education, 1997a), as one which will

“Effect a shift from one which is content-based to one which is based on outcomes, aimed at equipping all learners with the knowledge, competencies and orientations needed for success after they leave school or have completed their training. Its guiding vision is that of a thinking, competent future citizen”.

While Fien (1993) recognized that environmental education processes could play a crucial role in responding to many environmental crises, such as lowland fynbos biodiversity conservation, Schreuder (1995) cautioned that major contradictions still existed between the realities in schools and the socially-critical orientation required of teachers to contribute to

real educational transformation and social change. Kemmis et al. (1983, cited in Fien, 1993) emphasized that a socially critical orientation would require schools (teachers) to

“... engage society and social (and environmental) issues immediately, not merely prepare students for later participation, ... and give students (and teachers) experience in working on them- experience in critical reflection, social negotiation and organization of action”.

Schreuder (1995) predicted that change to such an orientation, which he considered a prerequisite for realizing teacher and community participation in educational change and environmental issues, would be problematic given the lack of financial resources to support these processes as well as the poor educational provision in historically-disadvantaged schools. Lotz (1997) suggests further that the implications of the new policies affects teachers in what and how they teach as well as how they will assess outcomes. Reddy (2001) indicated that the implementation of policies occurs at local level and requires the adoption by and support of educational institutions and professionals. I contend that, the responses of teachers from historically disadvantaged schools to using a PA such as WNR, are important indicators of the degree of support of the implementation of OBET in lowlands fynbos biodiversity conservation in a post-apartheid situation. WNR has been referred as a “laboratory on their doorstep” in the local community newspapers (Burbidge, 1995). I have thus located the educational aspects of this project around how teachers of surrounding schools make use of the reserve.

1.5. Conceptual framework for this study

This interdisciplinary thesis describes participation in biodiversity conservation of the WNR from different community group perspectives. It accepts that processes of social and educational change influence, and are in turn influenced by many factors and conditions. In this framework I highlight the participatory processes which are important to biodiversity conservation of lowland fynbos. Since 1994, there has been a conceptual shift in approach to biodiversity conservation from a more exclusionary “fines and fences” approach to a more inclusive and participatory approach, in the social as well as educational arenas. Box A in figure 1 below represents some of the issues and factors influencing biodiversity conservation in a local socio-educational context. Boxes B, C and D represent the crux of this research project as they deal with the responses and the degree of support of different community groups and teachers toward the issues and factors affecting the biodiversity conservation of the WNR. Box E represents the vision of this research project which is to use the outcomes of Boxes B, C and D and integrate them into management plans, policies and action programmes

which will govern how, and under what conditions, the community and managing authority will manage and use WNR.

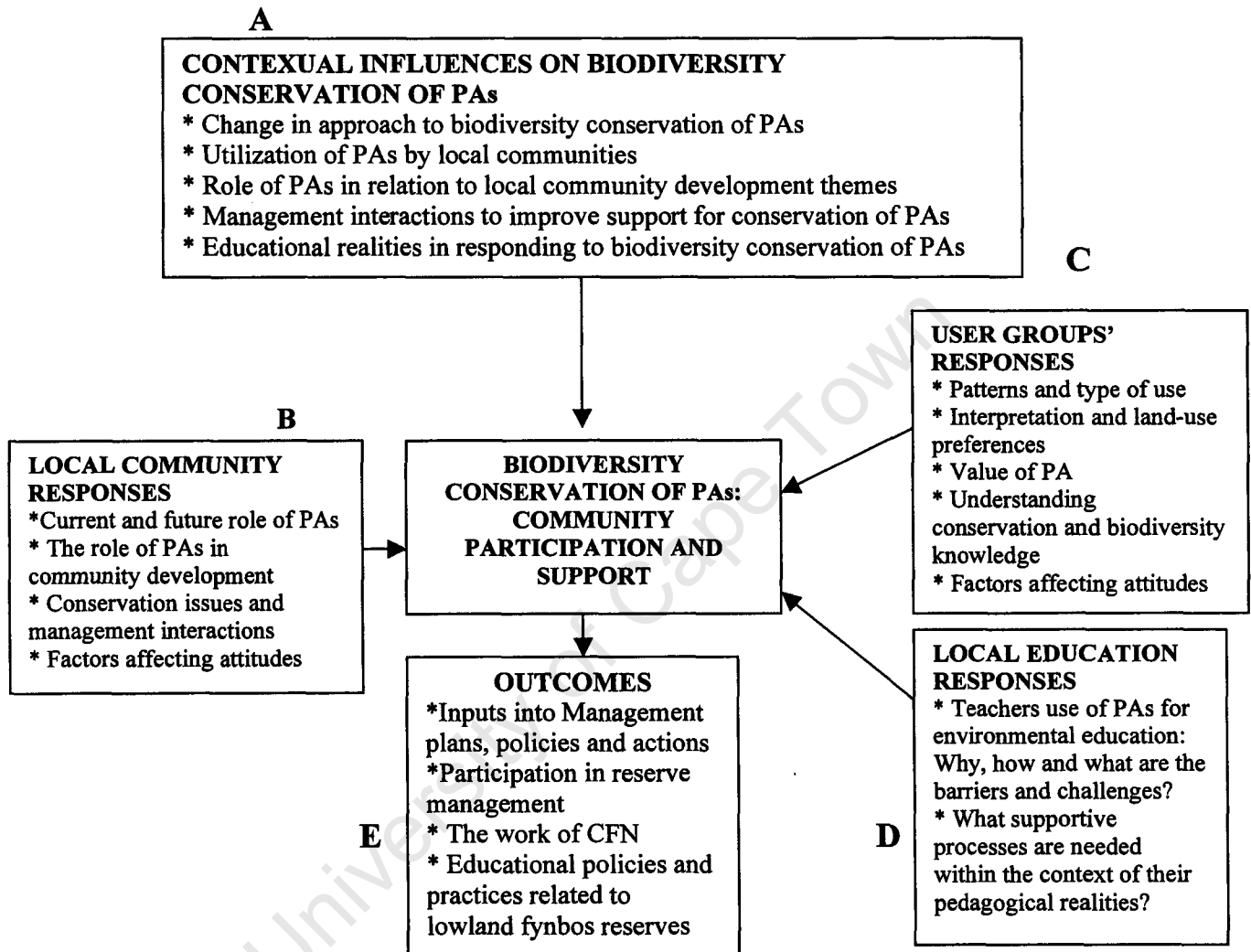


Figure 1.1. A conceptual framework for community-based participation in lowland fynbos conservation.

Getting community groups and teachers to participate in order to arrive at a collectively-negotiated outcome is a complex process, and requires the support of the local community, users and those involved in local educational processes. I contend that for lowland fynbos conservation to be sustainable, participation by local communities, users and local schools in guiding biodiversity conservation management is imperative. This is particularly important if these areas are to defend their existence in socio-educational contexts where poverty is high, areas for housing are scarce and the areas are poorly developed for use by users and local schools. WNR is such an area, and has been chosen to act as an example for other lowland fynbos areas in such contexts.

I conducted research in four contexts. Firstly, in the broader local community of Mitchells Plain surrounding WNR, I surveyed residents and community leaders. Secondly, in the two closest, adjacent suburbs of Tafelsig in Mitchells Plain and Harare in Khayelitsha I surveyed residents from culturally different backgrounds. Thirdly, I surveyed the main users comprising fisherfolk, teachers, secondary and primary school pupils. Fourthly, I engaged in an in-service teacher education process at a school closest to WNR and in WNR with teachers from local schools. The surveys were intended to consult respondents on the role of WNR and explore how best to improve mutual interaction between respondents and the management authority of WNR. The teacher programme was intended to familiarize teachers with environmental education opportunities in WNR and how they could use WNR in their classrooms.

1.6. Rationale for the research project

The rationale for this study emanates from the realization that the involvement and participation of local people in the planning and managing of lowland fynbos PAs such as WNR is seen as crucial if these are to continue to exist. Hence, understanding the attitudes and perceptions of local communities and users to the role of these areas and how communities groups would like to interact with these PAs is important. To date, no comprehensive survey has been undertaken to involve a local community in the planning and managing of any lowland fynbos PA.

My most important concern was to ascertain how urban local communities, which surround such natural areas, perceive and currently use or intend using such areas. I was also interested to determine the role of such areas in community development, and how to improve the interactions between the community and PA managers. The results will aid in guiding decision- makers on its conservation worthiness in an urban setting, where basic needs such as housing and employment could overshadow the need for a conservation area. In addition, neighbouring PAs also have the potential to act as living outdoor laboratories for local schools. Therefore, I wanted to ascertain how teachers could use the reserve in developing local curricula within the context of multiple reforms in education and in society. I believe that the monitoring of school reform and implementation initiatives can successfully be gauged from working with teachers and reporting on their responses. In so doing, this research project also wants to give teachers a voice to determine why and how urban, local nature reserves can be used for environmental education and how such curricula can be developed and implemented in local schools.

The research focussed on the following key questions which were arrived at after a pilot study.

- What are the attitudes of the three main community groups (residents and community leaders of the broader community; the immediately adjacent surrounding communities; and users) to the current and future role of the WNR with respect to its use, its role in other socio-economic development themes and management practices?
- What are the responses of teachers to utilizing WNR for environmental education opportunities?
- How can we use the outcomes of the above questions to bring about appropriate change in management practices, policies and actions to improve community participation in biodiversity conservation of WNR in particular, and of the region as a whole?

The need to explore these particular questions arose from my interactions with residents of the local community and teachers of local schools. Residents felt that the managing authority is neglecting WNR and will only listen to them if they invade the area. Teachers looked forward to using WNR as an outdoor classroom but felt that factors such as the neglected condition of the area, the lack of knowledge of the area, the lack of teacher fieldwork skills, and the lack of curriculum resource materials and pedagogical realities in schools all needed to be addressed in order to effectively use the area.

1.7. Dissertation style, presentation and chapter outline

Following this introduction, Chapter 2 provides an insight into the study area, focussing on the ecological, historical, social, institutional and educational context of the research. In Chapter 3 a review of the literature is undertaken. It describes the emergence of community conservation and environmental education as responses to the growing environmental crisis, especially in Fynbos, and particularly in the Cape lowlands. I provide a background to Protected Area management from the end of the 1970s to the present, clarify community conservation and discuss critical issues which determine support for community conservation. I then briefly discuss community conservation in Africa, South Africa and in lowland fynbos. I go on to discuss the role of environmental education in enhancing teacher participation in community conservation. I highlight the role of environmental education in responding to the global environmental crisis. I then discuss the South African macro-educational environmental as well as the role of socially-critical environmental education in responding to post-1994 political changes in South Africa. Chapter 4 clarifies my research methodologies,

choice of data production methods, data analysis procedures and explains the presentation of the research findings.

Chapter 5 is dedicated to the community conservation and education research data and starts with an introduction, followed by four sections. I report these in the form of individual research studies. Chapters 5.2 and 5.3 report on the socio-metric survey of residents and community leaders, and that of the adjacent two communities, respectively. Chapter 5.4 reports on the survey of the users. Chapter 5.5. reports on the responses of teachers to utilizing WNR, based on a workshop programme which included field visits, and reflective interviews conducted after the workshop programme. Chapter 6 provides a synthesis of the main outcomes of the socio-metric and educational aspects of the project. This is used to provide inputs into the management plan, policies and activities relating to WNR conservation. I then briefly discuss the implications for community participation in biodiversity conservation and reserve management as well as the work of Cape Flats Nature and educational policies and practices related to lowland fynbos reserves.

I conclude the research process by seeking common ground with regard to issues such as WNR use, its role in local community development, community-nature reserve relations and assessing sustainable use by local schools. I go on to discuss the possibilities for further research into ongoing conservation of lowland reserves such as the WNR, future funding, procedures and protocols for their use and issues affecting schools in using reserves such as the WNR. Finally, I reflect on the research process and try to identify the limitations and value of the project as well as my own personal reflections.

CHAPTER 2

THE STUDY AREA



CHAPTER 2

THE STUDY AREA

2.1. Introduction

This chapter describes the broader context of the Wolfgat Nature Reserve (WNR). Firstly, it describes the study area in terms of its location, history, unique features, biophysical aspects and its flora and fauna. Secondly, it goes on to describe its management and socio-economic environment.

2.2. The Study Area

The Wolfgat Nature Reserve (248 ha) is located on the False Bay coastline, in the Western Cape province of South Africa (Fig. 2.1). It is approximately 30 km from the centre of Cape Town. It is bounded by high residential development on northern boundary by a township called Mitchells Plain, with another township called Khayelitsha lying approximately 1 km north east. Underdeveloped areas, with undetermined zoning form the boundary to the west and east. These areas are presently uninhabited by people and appear as white spaces in figure 2.1. They are classified as undetermined in the City of Cape Town's spatial planning documents (City of Cape Town, 2001).

Its history dates back to the Pleistocene period some 75 000 to 125 000 years ago (Singer and Fuller, 1962; Hendey and Hendey, 1968; Klein, 1975; Rogers, 1982 and Rogers et al., 1990). In pre-colonial times some 15 000 years ago, the area was inhabited by indigenous communities known as the Khoi, who engaged in hunter-gatherer activities, especially shellfish gathering along its coast. In colonial times, after 1652, the area was not much used as it became waterlogged in winter and was too dry during summer to sustain large numbers of stock. By 1897, the area formed part of the Strandfontein and Eersteriver Forest Reserves under the then Department of Forestry. Between 1939-1945, during the second World War, the Department of Defence had coastguard installations along the coast at WNR. The name "Wolfgat" derives from a fossil brown hyaena (*Hyaena brunnea*), commonly known as a strandwolf, whose fossil remains were found in a cliff side midden (gat) in 1962 (Singer and Fuller, 1962).

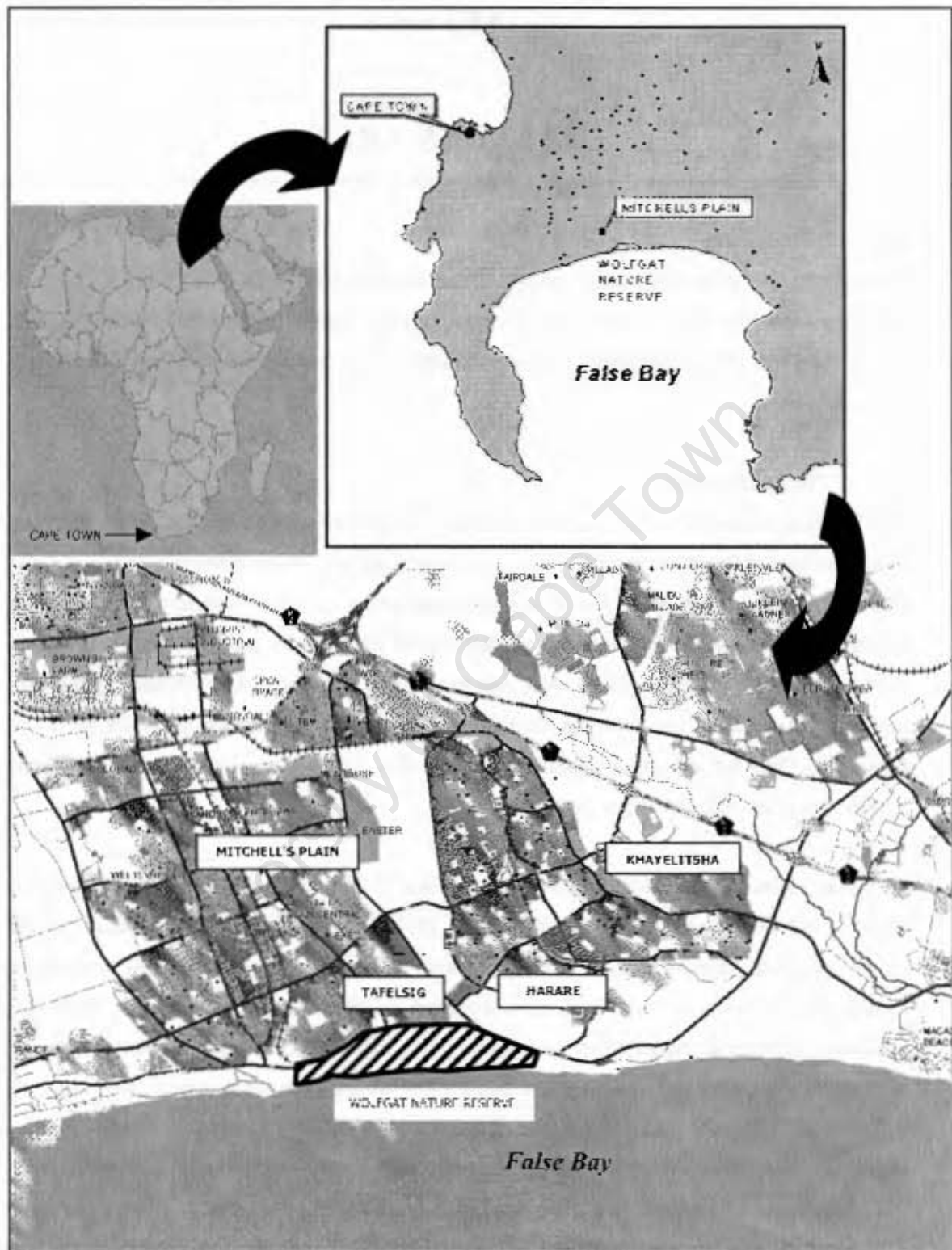


Figure 2.1. Location of the Wolfgat Nature Reserve showing the high residential development of Mitchells Plain and Khayelitsha, each lying to the north and north-east, respectively.

WNR is unique in that it is the largest nature reserve on the Cape Flats conserving rare forms of Strandveld and Cape Fynbos (Low, 1991). It is also the sole reserve protecting the natural

coastal dune and limestone systems of the False Bay coast. WNR forms the only known mainland breeding site of the Kelp Gull (*Larus dominicanus*) in the South Western Cape. The reserve comprises a diverse array of habitats, rich rocky and sandy shore marine life and high dunes and cliffs with sweeping views of False Bay and the surrounding mountain chains. These scenic views attract many tourist and film crews.

The topography, geology, soil, climate, flora and fauna of WNR have been described in detail in the reserve's Draft Environmental Management Plan (City of Cape Town, 2001). Topographically, the area comprises undulating south east/north west sand dunes of varying height (up to 60 m above mean sea level). Soils (Mispah form) are typically alkaline (pH 7.5-8.5) and are low in phosphates, potassium and trace elements with a low agricultural potential. WNR has a mediterranean climate with hot, dry summers and cool, wet winters. It receives about 600 mm of rainfall per annum (Britton, 1972). Strong (generally salt laden) south-easterly onshore winds blow in summer reaching up to 6.9 m/s while north-westerly winds prevail in winter. The winds to a large extent determine the nature of the vegetation present in WNR. Average summer temperature of 20.4 °C and 11.7°C in winter have been recorded (Low, 1991).

The flora at Wolfgat can be divided into indigenous and alien vegetation. The most recent local authority report (City of Cape Town, 2001) which provides a full list of species at Wolfgat, classifies the vegetation according to structural characteristics. It classifies the natural vegetation as Strandveld and as falling within the Fynbos Biome (Cowling et al., 1992). Strandveld found at Wolfgat is a mixture of thicket (broad leaved shrubs) and asteraceous fynbos (heathland) (Cowling et al., 1992). A total of 179 indigenous and 10 alien species have been recorded, with an expected increase of 20-40% of species such as annuals and geophytes in the winter and early spring (Low, 1991). Four plant which are described as threatened in Hall and Veldhuis's (1985; cited in Hilton-Taylor, 1996) Red Data book are found at Wolfgat. They are: *Euphorbia marlothiana*, *Hermannia trifoliata*, *Solanum crassifolium* and *Tetraria brachyphylla* (Hilton-Taylor, 1996). The dune asteraceous fynbos at Wolfgat is uncommon in that it grows on alkaline soils (ph 7-8). Dune thicket (non-fynbos communities), which usually grow on soils with a high pH, occurs mainly in wind-and-fire protected areas and on deep calcareous sands.

The impact and threat of invading alien plants on the indigenous vegetation is considered as severe (City of Cape Town, 2001). This has been recognized in the educational interactions with local schools and is reported upon in Chapter 5.5. Woody alien vegetation such as *Acacia cyclops* (commonly known as Rooikrans) and to a lesser extent *Acacia saligna* (

commonly known as Port Jackson) is present throughout the area, particularly in the eastern sections of the reserve.

In terms of its fauna, the reserve has over 3 000 named insects (Dr. H. Robertson, SA Museum, pers. comm), 4 amphibians (Dr. Mike Picker, Zoology Department, University of Cape Town, pers. comm.) and 22 reptile species, of which the Cape sand snake (*Psammophis leightoni leightoni*) is critically threatened. The angulate tortoise (*Chersina angulata*) is also threatened by human predation. A total of 86 bird species have been positively sighted thus far (Britton, 1972; Low, 1991), with the number likely to double if observations are continued in spring and early summer (City of Cape Town, 2001). A total of 15 mammal species have been observed in the area. Commonly sighted species include the Cape grysbuck (*Raphicerus malanotis*) and the Striped fieldmouse (*Rhabdomys pumilio*).

Marine flora and fauna surveys conducted in 1989 and 1991 have revealed that the area contains a high cover of algae and a rich diversity of marine fauna. It has high exposure to wave action and with the resulting sand movement, the marine communities are neither typical of rocky shores nor sand-inundated shores. However, the site can be accessed from the eastern car park area, where much fishing activity takes place and where an experienced person in seashore work can provide learners with a valuable educational experience, especially adaptation to sand and waves. A proper survey of both marine plants and animals should be carried out if this site is to be used for marine educational purposes.

2.3. Management and socio-economic environment.

WNR is managed by the "Parks and Recreation Branch" of the City of Cape Town. Staff include one reserve manager and one conservator. The decision by the local authority to establish a nature reserve at Wolfgat on 28 February 1980 formed part of the planning decisions of the development of Mitchells Plain. The provincial notice 244/1986 formally proclaimed it a nature reserve on 25 April 1986. Presently, its management is governed by By-law 154/1991 of 1994. This by-law was formed under the Nature and Environment Ordinance No. 19 of 1974, which also controls the management of all local nature reserves in South Africa. Under this by-law the WNR is managed by an advisory board which makes provision for community councillors, but is not represented by any resident or user from the local community. The main goals of the management programme are to optimize the conservation of WNR and sustainably manage the area for education and recreation, in partnership with the local community. To better understand the need for broad-based consultation of the local community, a brief look at the history of community involvement in management is necessary.

The first management plan for Wolfgat was drafted in 1992 by the City of Cape Town (Bellas, 1992, in City of Cape Town, 2001). This defined objectives and priority projects but involved no public participation. Public consultations with community organisations took place via workshops in February and October 1993. The purpose was to assess people's support regarding the future of Wolfgat. Both indicated that community support is crucial for the retention of Wolfgat as a natural area. In 1994, an opinion survey of a small cross-section of Mitchells Plain residents and community organisations conducted by Khan (1994) showed that this sample of the community largely supported the reserve, especially its use as a recreational area and an outdoor classroom.

The period 1993 - 1997 saw the establishment of an interim management committee which was mandated to draw up a constitution where Wolfgat should be managed as a joint partnership between the local authority and the community. Due to the loss of staff to manage Wolfgat after 1997, the constitution remained in draft form as very little contact took place between the two parties from 1997 to 2001. What contributed to the worsening situation was an apparent lack of commitment from the City of Cape Town, *ad hoc* law enforcement and patrolling, and since 1997 to 2004, no *in situ* manager and no dedicated finance. From 1997 to 2001, the annual capital and operating budgets have been R50 000 and R10 000 respectively. From 2002 to 2005, the annual capital and operating budgets have been R0.00 and R50 000 respectively (Alex Forbes, WNR Manager, City of Cape Town, pers. comm.). Although R1.2 million was approved in 2004 for capital infrastructure development, it has yet to be spent.

Following seven years after the first community consultation, a draft management programme, which is to be reviewed every 5 years (City of Cape Town, 2001), now guides all management, development and educational issues affecting Wolfgat. The attitudinal surveys' (Chapters 5.2, 5.3 and 5.4) and educational (Chapter 5.5) results of this thesis will therefore greatly inform the ongoing management policies and actions.

The management policies and implementation guidelines deal with ten issues:

- a) Habitat management focusses on the control of invasive alien plants and firebreaks involving local labour;
- b) Faunal management involves the conservation and re-introduction of Wolfgat species as well as the control and management of problem animal species such as feral cats and vagrant domestic cats and dogs;

- c) Rehabilitation management involves restoring areas degraded by human activities;
- d) Utilisation management involves increasing awareness via media (e.g. articles in local newspapers, TV, video, posters) and favouring sustainable use approaches such as environmental education (EE) programmes to capacitate local educators to develop and run their own EE programmes;
- e) Public consultation and participation management to arrive at a management partnership between the surrounding community and the City of Cape Town;
- f) Law enforcement management to create a safer environment for all users;
- g) Infrastructure and access management to allow free access to all areas in the reserve via relevant paths and signage but ensuring that the aesthetic quality of the reserve is maintained (e.g. placing litter bins and ablution facilities in strategic areas);
- h) Long term scenario planning to ensure that Wolfgat is viewed in the context of the conservation of the whole False Bay Park as well as its role as an eco-tourism destination along the False Bay coast;
- i) Monitoring and research to ensure that monitoring data such as plant and fauna species lists, vegetation changes, invasive alien plant spread, community usage patterns and formal scientific research are constantly monitored;
- j) Eco-tourism to take place in a framework that ensures the ongoing ecological integrity of the reserve.

The major portion of this research study was conducted in the local community and schools of Mitchells Plain. It also focused on the closest suburb of Mitchells Plain called Tafelsig, which lies immediately adjacent to WNR resulting in no transition zone, and the closest Khayelitsha suburb called Harare, approximately 1 km to the north east.

The surrounding townships of Mitchells Plain and Khayelitsha were developed from 1969 and 1980 respectively. From these dates on, these areas have seen an increasing growth in terms of infrastructural development as well as population growth. The greatest settlement in both townships took place between 1991 and 1995. By 1996 just after this study commenced,

Mitchells Plain had become home to 238 522 persons. Khayelitsha had 3 large suburbs and had a population of 500 000 persons. The suburb of Tafelsig had 44 250 people while Harare in Khayelitsha had a population of 19 798 persons (Census, 1996).

The majority of the population of Mitchells Plain and all users surveyed in this study are from the coloured ethnic group. Those of Harare are predominantly from the Xhosa (black) ethnic group. These two communities are thus two culturally distinct ethnic groups, each with different socio-economic and household-level dynamics. The Mitchells Plain community originated mainly from other Cape Flats townships and those evicted from an area called District Six on the slopes of Table Mountain because of the apartheid government's racially-based Group Areas Act. The main influx of about three quarters of the people (74.6%) to Harare came from black townships in the Western Cape, about 10.6% from the Eastern Cape and the remaining 15% from other parts of South Africa. Suburbs in Mitchells Plain are stratified along socio-economic lines with those in the higher income groups generally living further from WNR and the poorest living closest to WNR. In both the Mitchells Plain and Khayelitsha communities, unemployment rates in 2003 have been upward of 40%, up to 75% of residents in these poorer areas live below the poverty datum line of 352 South African Rands (around U.S.\$45) per adult per month (SALDRU, 2003).

In Mitchells Plain, youth of school-going age account for about one third of the population (Census, 1996). There are 68 primary schools and 20 secondary schools which serve the Mitchells Plain community, all within 8km of WNR. A small group of local primary schools have been using the reserve for environmental awareness from 1989-1992 as part of the WONAC (Wolfgat Nature Classroom Project) and again from 1995 on an ongoing basis when representatives from all schools, as a result of this project, established the Wolfgat Teachers' Forum. Environmental Education is highlighted as a resource use in the management plan (p. 26, City of Cape Town, 2001). Local residents use WNR for recreational activities such as walking, sightseeing and bird watching. WNR is also popular for fishing by both the local residents and other visitors from the broader Cape Town. Other low impact uses include collecting flowers, collecting plants for sale (e.g. the arum lily, *Zantedeschia aethiopica*) or medicinal purposes (e.g. brown sage, *Salvia africana-lutea*, which is used as a tea for coughs, colds, bronchitis and female ailments), cutting Rooikrans for firewood, fishing and filming by local and international companies.

Tafelsig has the highest crime and lowest income rates in Mitchells Plain. About 40% of the population is dependant on the social services grant, have an income less than R800/month and the area has the highest rate of Tuberculosis infections in the Western Cape and in South

Africa (Census, 1996). In Harare in Khayelitsha, 40% of households earn less than R800/month, about 45% are unemployed while an additional 15% have an unspecified income (Census, 1996).

2.4. Concluding comments

This chapter has described the study area, the management and the surrounding communities. Because of its geographic location WNR has been shown to be under increasing threat of urbanization. The area has a rich cultural-historical and ecological capital. Socio-economically, surrounding communities are underdeveloped and seek benefits from the area. With all the above “threats”, the education environment from 1995-2002 has been shown to be in constant flux and uncertainty. The future conservation of WNR is therefore inextricably linked to the local socio-economic and educational realities of the surrounding communities. In the next chapter, I describe the conservation and educational contextual environment within which the research took place.

CHAPTER 3

BIODIVERSITY CONSERVATION AND EDUCATIONAL CHANGE ALONGSIDE PROTECTED AREAS: BACKGROUND AND CONTEXT OF THE RESEARCH PROCESS



CHAPTER 3

BIODIVERSITY CONSERVATION AND EDUCATIONAL CHANGE ALONGSIDE PROTECTED AREAS: BACKGROUND AND CONTEXT OF THE RESEARCH PROCESS

3.1. Introduction

There is widespread recognition that the consultation and participation of local communities in Protected Area (PA) conservation management should form part of mainstream conservation practice (see e.g. Adams and Hulme, 2001; Barrow and Murphree, 2001; Hulme and Murphree, 2001; Holmes, 2003). In this chapter, I discuss the changing nature of participation in PAs by communities and local schools, particularly in the changing socio-political context of South Africa after the demise of apartheid in 1994. I sketch a story of participation in biodiversity conservation by discussing biodiversity conservation from the colonial era to present, provide a brief summary of the world's PAs, clarify community conservation, and compare previous and current approaches to conservation. I go on to discuss community conservation in Africa, South Africa and analyse urban conservation and the participation gap in lowland fynbos conservation. I then highlight critical issues which determine support for conserving PAs.

With an increased support for the idea that educational participation can play a crucial role in the conservation of lowland fynbos PAs, I discuss the role of environmental education (EE) in enhancing teacher participation in community conservation. I provide some background by discussing the role of EE in responding to the global environmental crisis, and define EE. I then discuss the use of PAs for EE. I go on to discuss the macro-educational environment in South Africa prior to and after the demise of apartheid in 1994 in order to contextualize the situations of teachers grappling with educational change in a period of socio-political transformation. I end by discussing the role socially-critical environmental education can play and how it could form a guiding framework for teachers responding to educational challenges when needing to use PAs adjacent to their schools.

the fortress conservation narrative, which they termed “the back to the barriers movement”. Essentially, this movement argues that biodiversity can only be conserved in areas free of all human influence, except in areas of science and ecotourism, that PAs need to be centrally managed and that local communities should be excluded from all decision-making processes about the management of PAs. Hutton et al. (2005) presents a suite of counter-arguments to the “back to barriers” narrative, which shows that science-led solutions cannot alone ensure biodiversity conservation. By constructively working with people via legitimate, democratic processes, long-term biodiversity conservation can be achieved (Brechin et al., 2002). This will result in programmes of sustainable use that revolves around communities (Hutton et al., 2005).

There have also been authors who advocate more people-orientated approaches to biodiversity conservation and involve local communities in decisions regarding PA resources (Agrawal and Varughese, 2003; Wells and Brandon, 1992; Western and Wright, 1994; Pimbert and Pretty, 1995; Hutton et al; 2005). This shift in thinking to more people-orientated conservation became institutionalized at the IVth World Congress on National Parks and Protected Areas in 1992 (Mc Neely, 1992; 1993; Barzetti, 1993). It was further identified as one of the five key themes by The World Commission on Protected Areas, and considered a cross-cutting theme for the Fifth World Parks Congress in Durban, South Africa in 2003, which had “benefits beyond boundaries as its theme (Brown and Kothari, 2002; Steiner, 2003). This thinking has been further reinforced by global agreements reflected in international documents such as the Global Biodiversity Assessment (Heywood, 1995) and Global Environmental Outlook (GEO3, 2002), a scenario document for PAs in 2023 (IUCN, 2003). It is further reflected in a recent exhaustive review produced by an expert panel of The Convention on Biological Diversity of PAs and the Conservation and Sustainable Use of Biological Diversity (Vierros and Barber, 2003).

Community conservation proponents have advocated that for biodiversity conservation to be sustainable, the involvement, participation and support of local people in the planning and managing of protected areas is crucial if these are to continue to exist (Wells and Brandon, 1992; Western et al., 1994; Durbin and Ralambo, 1994; Adams, 1996; Agrawal and Gibson, 1999; Adams and Hulme, 2001; Hulme and Murphree, 2001; Brechin et al., 2002). This move towards more people-orientated approaches guided by a suite of strategies called community conservation has gained even greater momentum after the year 2000 due to a greater understanding of the need to include social and political processes (Brechin et al., 2002; Wilschusen et al., 2002).

(Table 3.1) (West and Brechin, 1991; Adams and Shane, 1992). This approach conforms broadly to Murphree's (2001) notion of "conservation for the people".

Collaborative Management

This describes situations where some or all of the relevant stakeholders in and around a PA are involved in a substantial way in management activities. This involvement may also be between a private sector interest and a community or conservation authority. The resource (s), however, are usually governed by national policy or legal instruments and are not legally owned by local resource users (Table 3.1). While collaborative management arrangements may cover a variety of types of resource use, conservation objectives remain the driving force. Where benefits derived from resource use are an important contribution to local livelihoods, the collaborative management agreement is likely to be stronger than when benefits are few to local resource users (Barrow and Murphree, 2001). Murphree (2001) describes this as "conservation with the people."

Community-based conservation

These approaches incorporate programmes which have the sustainable use of wildlife resources and wild land by (rural) people, under communal tenure conditions, as the objective (Table 3.1). Three particular emphases are found in this approach:

- a focus on economic incentives based on the perception that (rural) people will not manage wildlife resources or wildlands in a sustainable manner unless it is perceived that it will yield greater returns than other forms of land use;
- a focus on the devolution of authority and responsibility to communities with the assumption that this will create an incentive framework for favouring sustainable utilization;
- a focus on the development of communal institutions and structures for the management of these entitlements which allows communities to effectively control use, distribute benefits to their membership and efficiently exploit opportunities in the natural resources market.

Murphree (2001) describes this as "conservation by the people". This approach allows conservation objectives to be driven within a developmental framework, by the people.

Barrow and Murphree (2001) caution that the three types of community conservation are not to be seen as mutually exclusive, particularly if national and regional conservation policies must encompass multiple objectives. Multiple objectives require multiple approaches and the match between objective, context and approach is crucial for a successful CBC programme.

3.2.4. Community conservation in Africa

Community conservation in Africa has been extensively studied in both east and southern Africa (Hulme and Murphree, 2001). In the east, the focus has been on park outreach strategies while in southern Africa the focus has been on CBC or Community-based Natural Resource Management (CBNRM). Although Barrow and Murphree (1998) provide examples of PA Outreach, collaborative management and CBC (see Table 3.1), all studies were undertaken in rural areas with no examples of CBC given for urban areas.

In referring specifically to community conservation programmes in east and southern Africa, Barrow and Fabricius (2002) identify seven factors which have influenced the policies of governments, parastatals and NGO's in moving towards community conservation. They are: a) the pressure to promote development through conservation; b) the need to diversify the economy by including tourism and natural resource use; c) a lack of resources for law enforcement; d) community pressure and subversive behaviour such as land invasions; e) pressure for land reform; f) a desire by conservation organizations to acquire new land; and, g) the recognition by governments that rural voters are important has led politicians to claim responsibility for the success of community conservation.

3.2.5. Community conservation in South Africa

In South Africa, independence from Britain was replaced by the Apartheid system in which whites retained political power. Because of the racial discrimination practiced during the Apartheid era, state and parastatal conservation bodies were not permitted to involve black people in policy setting or management (Luckett et al., 2003). As a result, the policies of these institutions did not involve local black communities adjacent to PA in any decisions regarding the use of PA resources.

In South Africa, the most comprehensive CBC study found in the literature is that of Infield (1988) who conducted a community conservation study in the province of Kwazulu-Natal. He researched the attitudes of a rural community towards the Umfolozi/Hluhluwe/Corridor Complex Game reserve. He indicates that two factors were important when examining the relations between local communities and conservation areas. These were the historical, political and economic situation of the area and the influence of the Apartheid policy of the previous government of South Africa.

His study involved a wealthy, largely white conservation authority and a black community characterised by severe economic and environmental problems. He found that there was a great lack of acknowledgement by the conservation authority of the traditional usage and

KZN wildlife as they saw them as providing educational programmes and job opportunities, respectively.

In another study, Cock and Fig (2000) explored environmental racism and traced environmental justice in the National Parks of South Africa from colonial times (1898) up to the year 2000. The authors show how the organization has moved from the colonial philosophy of exclusion of black visitors prior to 1994, to a philosophy of community-based conservation that links biodiversity conservation to human needs and benefits. Through their Social Ecology programme, they have started to address environmental justice issues such as: addressing land restitution; racism and sexism; improving relations with and involvement of communities in management committees in 10 of the 17 national parks; improving accessibility, especially via environmental education for black schoolchildren; promoting tourism and income generation opportunities for black businesses; developing cultural resources and heritage sites to contribute to nation building and a common society.

In another post-apartheid study, Luckett et al. (2003) traces the initiatives taken by the wildlife managing authority in the Kwazulu-Natal province, called Ezemelo KZN Wildlife –EKZNW, and illustrates that involvement and participation of communities neighbouring PAs in decision making and management of nature conservation can be successful. Since 1997, EKZNW has employed a neighbour relations strategy based on two pillars. Firstly, community involvement is achieved via local boards comprising of 15 persons each from different sectors such as traditional authorities which comprised community leaders such as the traditional amaKhosi, the business sector and special interest groups amongst others. They compile and monitor management plans, which seeks to promote development of local communities, conservation education and determine local policies with regard to resource protection and management, and ecotourism. These boards have been empowered through skills and capacity building workshops and a relationship of trust has been built when conservation officials acted on decisions taken at their meetings. The second pillar involved the establishment of a Community Levy Fund from levies charged to visitors to the PAs. It is a capital fund, where 10% is kept in the fund for growth and 90% is disbursed to projects identified by adjacent communities of the PAs. In one instance, disbursed money was used for developing a new tourist lodge in the PA and a share of the future income was earmarked for projects in their area. Challenges that arose concerned community representation, disbursement of funds and land claims in the PAs. While the amaKhozi is recognised through the local boards, they are not the sole representative of local communities. Other parties such as farmers and business people for example, are also representatives. A particular problem that arose was when tourism revenue had to be shared in terms of a “Policy of Sharing”. The

juvenile offenders. Wattle Park (60 ha) is primarily used consumptively for example golf, weddings and a playground, and by university groups who use the area for environmental studies and schools who use the area for playground and other activity areas. Together, these parks provide an annual avoided cost of AUD 4.45 million per year (this is equivalent to US \$3.115 million per year). This would be the cost incurred if visitors had to visit another park further away. Lessons learnt from this are that these urban PAs, which are contextualized in an urban environment setting, do provide more diverse benefits than rural PAs. These benefits accrue to individuals, businesses, public sector agencies and local communities living close to these PAs. Individuals and businesses benefited from operating guided tours in PAs, selling of goods and services to the PA agency and to visitors, being directly employed in the PA, and taking on contracts which involve capital works such as upgrading the PA and removing alien vegetation. Properties closer to PAs generally increased real estate values and provided more rate revenue to the public sector agency such as the local authority. Individuals also benefited by the knowledge that these areas are safeguarded for future generations. They have also been shown to medically benefit from visiting these PAs both psychologically, as they enjoy the aesthetic qualities of open spaces, and physiologically from effects such as a lowered heart rate, lower blood pressure, stress reduction, relaxation and exercise (Hamilton-Smith, 2001). These three PAs have shown to benefit the communities around them by promoting social cohesion when community groups socialize or by volunteering to work in PAs on environmental programmes; promoting historical and cultural heritage through their educational activities; and being resources for EE for schools and universities.

Urban conservation PA managers have also developed strategies to increase political support for urban biodiversity protection by integrating these strategies into city policy development. In London (Goode, 2005; cited in Trzyna, 2005), Durban (Roberts et al., 2005; cited in Trzyna, 2005) and Cape Town (Katzschner et al., 2005; cited in Trzyna, 2005), in South Africa, PA managers have strategically integrated urban conservation into overall city planning in order to integrate or mainstream their biodiversity strategy into the overall city open-space planning process. In London, a five-pillared Mayor's Biodiversity Strategy, which has the social dimension at its core, has successfully been adopted at a hierarchy of sites at Metropolitan, Borough and local levels. This strategy includes specific policies and proposals to protect and enhance biodiversity through strategic planning. The Durban study focussed on the economic value of open spaces. It was found that the total replacement value of the environmental services delivered by open space in Durban is estimated at R3.1 billion per annum, which excludes Durban's tourism sector. By placing an economic value on open spaces, the strategy was to make biodiversity understandable to the majority of urban stakeholders. The City of Cape Town has developed a Biodiversity Strategy with seven core

commitment of the authorities to the recovery of the natural and cultural heritage. Results so far indicate that activities have been successfully carried out. These included consulting local community leaders on their expectations, developing interpretation materials for users, consulting the local community via a workshop on ways to use the area, organizing a workshop for teachers on relating the reserve to the school curriculum, forming a support group for the reserve and offering a bird observation course for neighbours, guides and volunteers. De Francesco (2005; cited in Trzyna, 2005) reports that what has made the Otamendi process work was because of two factors. Firstly, different sectors of society are working together, involving at least 30 key people which includes reserve staff and volunteers, members of seven local NGO's that work on social and educational participation, representatives of national, provincial and municipal authorities and the local school network. Secondly, all activities have been patronized, financed or organised in conjunction with different levels of government.

Issues which arose from these international and South African urban conservation studies have indicated that urban PA managers should understand the following eight issues in order to implement PA conservation policies in an urban context: 1) the potential socio-economic benefits local communities are desiring i.e. how they would want to use the PA; 2) the type of barriers that prevent visitors from coming to and using an urban PA; 3) how other community groups (e.g. community leaders) can interact with PA managers to examine how the benefits provided by the PA can be used in local community development, especially in poverty reduction; 4) how eco-tourism for example, which could use local goods and services, may encourage community support for the presence of the PA; 5) how to build constructive neighbourhood relations programmes and organizational links with other environmental NGO's; 6) what factors hamper effective neighbourhood relations programmes; 7) that the type of expenditure on visitor infrastructure and interpretation will depend on the type of visitor using the area and the type of benefits, in terms of goods and services, these visitors want to obtain; 8) to be able to carry out coordinated planning and management by being aware of programmes of other government agencies, and the extent to which the objectives of these programmes coincide with, or are compatible, with the objectives of the PA?

While most studies have focussed on the interactions between PAs and rural communities in South Africa, there are very few studies on the value of urban lowland fynbos PAs to local communities. Since 1990 and shortly after the demise of apartheid in 1994, only three attitudinal studies have been undertaken. These are: a survey of the attitudes of users to the Driftsands Nature Reserve, in Cape Town (Nguta 1992); a rapid survey of residents and users to the Wolfgat Nature Reserve, in Cape Town (Khan, 1994); and a survey of youth

Davis (2005) has analysed the pivotal role CFN is playing in facilitating the convergence of city planning and PA management on the Cape Flats. He found that three key lessons have contributed to the success of CFN thus far. Firstly, CFN has been able to use seed funding not tied to local government budgets to devolve decision-making and planning about these pilot sites to community stakeholders, where actions decided upon fitted into community agendas without compromising ecological objectives of these sites. Secondly, by building honest partnerships communities have been able to adopt biodiversity conservation for their own reasons. This included using PAs for education, job creation through environmental maintenance, or even just to improve the quality of life. Through this process, an appreciation for PA conservation was seen to emerge and take its place in community dialogue. Thirdly, CFN has engaged in a process to develop local leadership who will have the knowledge relating to PA conservation and be able to initiate actions that will ensure the security of species and their habitats, and provide community groups with the option of stewardship. CFN has thus started as an initiative to conserve the Cape Flats biodiversity by engaging with people rather than erecting fences. The open space system maintained by the local government is the spatial framework within which this must happen.

Recently, Soal and van Blerk (2005) produced an evaluation report on the work of CFN. They found that there is no alternative but to involve the social aspects of local communities into the conservation and biodiversity management of these PAs in urban settings. The report indicated that the conservation attributes of these areas were not enough to get community "buy-in", but that the areas have to provide tangible benefits for local communities. In addition, tensions arose from communities bordering these PAs as they constitute both persons from urban and rural origins. Urban communities now have access to these areas after being excluded due to apartheid, while rural persons traditionally always had free use of nature. They concluded that change in attitudes of individuals and organizations toward lowland fynbos conservation is necessary in order to conserve these sites in policy and practice.

Particular questions raised by respondents in the evaluation, which also resonated in the above international and local studies on urban conservation, were the following:

- How can urban nature sites, such as the WNR, be of material, social and spiritual/cultural use to surrounding communities and users of these areas?
- How do we improve the relationship between the conservators and the community?
- What are effective interpretation and communication tools when communicating the value, successes and challenges of these sites to users and adjacent poor communities?

which compromise conservation objectives (Hackel, 1999). The problems are exacerbated in developing countries where there is insufficient management capacity to set and ensure levels of resource use that are sustainable (Wilkie et al., 2001). Insufficient financial capacity to monitor and mitigate excessive resource use over time is often cited by PA managers as the key factor militating against effective biodiversity conservation (James et al., 1999). Furthermore, local authorities in developing contexts generally do not have the resources to police the area (Durbin and Ralambo, 1994; Soal and van Blerk, 2005) and stop rapidly growing, adjacent populations from putting increasing pressure on often fragile ecosystems (Hannah, 1992; Wells et al., 1992).

There has been ongoing debate on the benefits and threats of using PAs for ecotourism in order to conserve PAs. Some authors (e.g. Goodwin, 1996; Gossling, 1999, both cited in Kruger, 2005) argue that ecotourism can benefit PAs. Kruger (2005) identifies four ways in which ecotourism can benefit PAs: Firstly, by generating money to manage and protect natural habitats and species resulting in more effective conservation of the PA; Secondly, by enabling local communities to gain economically from PAs; Thirdly, by creating revenue on a regional and national scale; and Fourthly, by raising awareness in local communities and positively changing attitudes towards the conservation of PAs. Other authors argue that ecotourism always threatens conservation of PAs, revenues generated are too small to support conservation on a larger scale and that ecotourism and conservation are always antagonistic (see e.g. King and Stewart, 1996; Durbin and Ratrimoarisana, 1996; Isaacs, 2000; - all cited in Kruger, 2005). In a meta-analysis of 188 case studies to determine if eco-tourism could be sustainable, Kruger (2005) found that the involvement of local communities was the most important reason for ecotourism projects to be classified as sustainable. Other authors (Heywood, 1995; Child, 1996) also indicate that local community involvement is paramount for the success of an ecotourism project. The exclusion of local communities led either to increased poaching and other negative forms of consumptive use. Involvement in planning, decision making and being part of the labour force increased the success of the ecotourism project. The type of flagship species also influenced whether ecotourism was sustainable or not, and charismatic bird and mammal species were associated with a higher probability of sustainability. Ecotourism can only be an effective conservation tool under certain conditions which Kruger (2005) identifies as: appropriate infrastructure, access, political stability and local safe conditions, effective marketing and spectacular natural features. Findings of Jha (2005) concurs and suggest that good infrastructure and civil order may be more important for the success of an ecotourism project in PAs than the income generated by the number of visitors. Besides these factors which Kruger (2005) based on ecological sustainability, other

Fiallo and Jacobson (1995) have found that 62% of residents in and outside the Machalilla National Park in Ecuador reported poor relations with Park staff.

Some international studies have investigated how to build positive relationships and reduce conflict between parks employees and local communities (Hough, 1998; Quingkui, 2003). Hough (1998) for example, reported that personal contact was important both for communication and building trust between residents and park staff. Bauer (2003) mentions that an option often mentioned to mitigate conflict without compromising conservation is a compensation system for wildlife damage. Hamilton and Walters (2002) have also shown that information and education programmes in adjacent communities can also improve relationships between communities and PA personnel. In South Africa prior to 1994, the relationships between neighbouring communities and PA staff were typically characterized by misunderstanding, conflict and mistrust (Ellis, 1994). The study undertaken by Infield (1988) in Kwazulu-Natal province showed that black residents expressed support for the concept of conservation, but had a poor understanding of the purpose of the PA and showed significant hostility towards the conservation authorities. In the post-apartheid study on the same communities, Picard (2003) found an improved understanding, very high support for the PA, but still significant amounts of hostility toward the PA management. She found that this was related to poor contact and familiarity of residents with PA staff, the amount of employment benefits they received from the PA managers, and the rate of visitation by the different stakeholder groups. This phenomenon of being more positive if services and benefits are received from PA managers have also been observed in local people living around the Selous Game Reserve in Tanzania (Gillingham and Lee, 1999).

3.2.7.4. Understanding the factors that lead to public support of PAs

Fiallo and Jacobson (1995) write that an understanding of the factors leading to public support should be seen as the first step in the process of developing policies to enable the conservation of PAs. Weladji et al (2003) considers that the success of policies depends on whether stakeholders are positively or negatively affected by conservation.

Many studies in developing countries have shown that those who benefit from PAs are more likely to express positive attitudes towards conservation (e.g. Lewis et al., 1990; Heinen, 1993; Newmark et al., 1993; Fiallo and Jacobson, 1995; Studsrod and Wegge, 1995; de Boer & Baquette, 1998; Gillingham and Lee, 1999; Abbot et al., 2001; Mehta and Heinen, 2001; Bauer, 2003). However, if benefits are unequally distributed, negative attitudes are expressed in spite of benefits (Parry and Campbell, 1992). Negative factors include a restriction on

which influence their usage have all been considered as essential to drawing up long term, sustainable Environmental Management Plans (Murphree, 1991; Happold, 1995; Heinen, 1996; de Boer and Baquette, 1998; Sah and Heinen, 2001).

Kellert (1996) suggest that wildlife knowledge assessments of users and local communities are important for biodiversity conservation all over the world because a knowledge of flora and fauna can significantly influence people's attitudes to conservation and ultimately their support for conservation. Nyhus et al. (2003) considers that this knowledge can help to determine the need for, or characteristics of, biodiversity and education programmes. It will thus be important that researchers understand wildlife knowledge of users of PAs in order to gain baseline information and inform the development of appropriate awareness and education programmes.

Despite the findings of Khan (1994) that users wanted WNR retained as a nature reserve for recreation and education, a lack of understanding usage patterns, factors that influence use, preferences and perceptions of users of the area, as well as users' knowledge of flora and fauna have all been found to hamper the use of an urban lowland fynbos conservation area such as the WNR (City of Cape Town, 2001). This project aims to address this.

WNR has also been high on the local community political agenda since 1995 to present for its lack to demonstrate effective use as part of the upliftment of the community. It has also been one of four lowland fynbos pilot sites of the Cape Flats Nature (CFN) project where the involvement of local communities and users in management of these areas are being tested. To date, the Cape Nature Programme has still to gain a detailed analysis on users of WNR. The findings of this project will be able to close this gap.

3.3. The Role of Environmental Education in enhancing teacher participation in Community Conservation

3.3.1. The role of environmental education in responding to the global environmental crisis

Environmental education (EE) has been an internationally recognized social movement which assumes this importance through its potential to involve people at local, national and global levels in socially active, problem solving, critical and participatory processes (Lotz, 1996). As such, it can be seen as an important component of community conservation.

The potential of EE to provide action frameworks and policy responses to the global environmental crisis has been well documented (see the Tbilisi Declaration (UNESCO-

3.3.2. Defining Environmental Educations

Many researchers (e.g. Fien 1993, O'Donoghue 1993) have embraced the following definition which is an adaptation from the IUCN working definition: Environmental education is “a process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and also entails practice in decision making, starting with primary environmental management and leading on to the self-formulation of a code of behaviour about all issues concerning environmental quality.” It is recognized internationally that narrow approaches to EE which view the environment in terms of bio-physical processes, are not adequate to solve complex environmental issues. A socio-ecological picture of environment puts people at the centre of environmental concerns, and recognizes the socio-historical origins of environmental problems (Lotz, 1996).

Three discrete forms of EE based on differing ideological perspectives have been identified, described and critiqued in various ways by many environmental educators (Huckle 1991; Robottom and Hart 1993a;b; Schreuder 1995; Spork 1992). They are:

- Education *about* the environment which emphasizes knowledge about natural systems and processes and the ecological, economic and political impacts of human decision-making on the use of the environment;
- Education *through* the environment which emphasizes students' experiences in the environment as a means of developing learner competencies and values clarification capacities; and;
- Education *for* the environment which has an overt socially-critical agenda of values education, social change and transformation through action-based exploration and involvement in the resolution of environmental problems (Fien 1993).

3.3.3. The use of Protected Areas for Environmental Education

The use of PAs primarily for EE have been recorded in urban situations where PAs are small (less than 350 ha), undeveloped and highly contested for alternative land uses. Examples are Costanera Sur Natural Park (320 ha) in Beunos Aires in Argentina and Yatsu-Higata wetland reserve (40 ha) in Tokyo in Japan (Phillips and Gay, 2001). Rainham Marshes reserve (375 ha), in city of London in the United Kingdom, is also of this type (Phillips and Gay, 2001).

In urban nature areas where issues such as pollution or invading alien plants cuts across educational disciplinary boundaries, EE can overcome the shortcoming of monodisciplinary education by using the environment for teaching and learning (Simmons, 1996). Simmons

lack of parental and community support. (Johnson-Prynn and Johnson, 2005). In a more developed context in Israel, Tal (2004) has found that teacher-parent collaboration in a middle-class school in using the local natural environment for EE has been highly successful. Six to eight field trips takes place per class per annum, which related to the Science, Environmental Education and Social Studies Interdisciplinary School Curriculum. Simmons (1998) also reports that safety was perceived as an important barrier to teachers who were using four natural settings (rivers, deep woods, country par, urban nature) for EE. In addition, decisions to use a specific setting was dependent on the teachers' level of confidence and their sense of being well prepared to teach EE (Simmons, 1998). Other studies in England (Agyeman, 1998) and in Cape Town, South Africa (Wagiet, 1996), have shown that teachers who are unfamiliar with the ecology of an urban nature area do not have the confidence and use these settings less than areas such as parks

Implementing the use of EE in PAs can be difficult as teachers in general are faced with contextual as well as logistical challenges. McLaughlin (1998) found when their broader organizational environment is not supportive or there is a lack of external support from, example, NGO's (Brijker et al., 1995), teachers find it difficult to use the natural environment for EE. Teachers' lack of skills and knowledge to take students to such natural areas (Simmons, 1998) as well as gaps in their training and development via INSET (Ham and Sewing, 1988; Simmons and Young, 1991) have been found to be important challenges in teachers using natural areas for EE.

Other supportive processes that enhances the use of PAs by teachers for EE have been identified as collaboratively developed curricula and curriculum materials (Carr and Kemmis, 1986; O'Donoghue, 1990; Taylor, 1995), an understanding of change theory and processes (Fullan, 1993; Dadds, 2001; Wilmot, 2004), and an understanding of official Department of Education policies.

3.3.4 South African macro-educational environment prior to 1994

Prior to 1994, the education system in South Africa was racially segregated under the policy of apartheid which can be summarised as follows:

- There were separate curricula based within different education departments (Sedibe, 1998) for the different ethnic groups with no core curriculum (NEPI, 1993);
- Allocations of finances and resources to schools were based along racial lines, with white schools receiving the most, followed by coloured, Indian and black schools (Mickelson et al., 2001);

3.3.5. South African macro educational environment after 1994

Reddy (2001) has thoroughly documented the educational context in South Africa after 1994, especially the main policies driving the educational transformation process after 1994. This I briefly summarise. The main policy documents to guide transformation of the education system after 1994 included The White Paper on Education and Training (1995), the Curriculum 2005 framework document (Department of Education, 1997b) and the Norms and Standards for teacher education (Department of Education, 1999). The period 1995-1997 was dominated by the development of a National Qualifications Framework (NQF) which was to replace the various accrediting bodies of the old education system. The NQF was provided for by the South African Qualifications Authority (SAQA) Act in 1995. The main national policy was centred around a discourse called "Outcomes-based education and Training – OBET). The approach of the NQF was to develop a set of critical outcomes to drive all education and training processes, and convert 42 subjects into 8 learning areas each with specific outcomes. A national outcomes-based curriculum called Curriculum 2005 (Department of Education 1997a) was developed for the compulsory phase of schooling, that is, the General Education and Training (GET) band which includes Grades 1 to 9. Curriculum 2005 contained 12 critical and 66 specific outcomes to guide all teaching and learning. The technical committee which developed this document suggested that learning area committees should not be prescriptive, but descriptive, so that schools can build their own learning programmes, even suggesting that teachers should ignore previous syllabi. Other authors (Van Harmelen, 1999; Wilmot, 2004) suggest that C2005 has a sufficiently flexible methodology which provides more exciting possibilities for curriculum innovation than was the case in the past.

Lotz (1997; in Reddy 2001) writes that this had implications for how teachers teach, what they will teach and how they will assess pupils' work. In South Africa, and especially at the 38 conservation sites in lowland fynbos, this represented an ideal opportunity for these PAs to serve an educational and scientific purpose. In terms of what teachers will teach, a PA such as WNR provided many opportunities for teachers to develop learning programmes to meet the outcomes required by this "flexible curriculum which sought to encourage participation by teachers, parents, education authorities and learners" (Department of Education, 1997a). To facilitate how they will teach, this same document indicates that learning support materials (LSM) will be provided in the form of notebooks, textbooks and workbooks, but that teachers had to draw from their own experience to develop LSMs. In terms of assessment, teachers were asked to "assess pupils on a continuous basis and report on what pupils actually understand, know and can do". Lubisi et al., (1997) write that learning would now be directed to acquiring abilities and skills rather than memorizing information. However, Wilmot (2004) indicates that the mechanics of the OBE curriculum posed great challenges to teachers as now

societies (Fien 1993). The participation of schools in biodiversity conservation within their communities can thus be seen as a supporting component of community conservation.

Greenall Gough and Robottom (1993) see socially-critical orientation as having implications for the styles of teaching adopted and the nature and content of the curriculum. Shreuder (1995) argues that socially-critical education *for* the environment counters existing rationalist ideologies and is a way of achieving social transformation and participation in educational reconstruction. Seen from this perspective, EE becomes a responsive process whereby environmental problems are addressed from within the school environment, made possible through active participation and ongoing critical reflection-in-action by teachers and students (Lotz, 1996).

With the new curriculum encouraging communities to participate in education, it is important to explore if teacher practice could contribute to student actions which would enhance the conservation of fynbos lowland PAs, such as WNR. The literature identifies two perspectives to this question. The first view of education shows teachers as being disempowered, passive human beings who subscribe to languages of critique and reproduction (Giroux, 1981) where teachers are alienated from the tasks of social reform that socially-critical education can serve (Fien, 1993). The second view contends that teachers can engage in socially-responsive educational processes.

In the first perspective, Hart (1993; cited in Lotz, 1996) suggests that the implementation of socially-critical EE in the formal school context appears to have “failed” due to “gaps” between the goals and processes of socially-critical EE and those of schooling. Schreuder (1995) notes some of the challenges that will hinder real transformation and social change. They are: choice of research orientation; materials development processes; the ability of the new education department’s ability to provide and develop appropriate teacher in-service education and training (INSET) programmes to redress some of the inequalities in teacher education in the past (see Chapter 5.5. for an exploration of these challenges in practice). One aspect which he predicts as being problematic in practice, is the realization of teacher and community participation, given the lack of financial resources to support these processes. Pressure for educational provision in historically disadvantaged schools, such as on the Cape Flats, also makes “curriculum as prescription” (Goodson, 1990) a less demanding option.

The second perspective involves the application of the critical theory to education. The application of critical theory to education (see Huckle, 1993), has rejuvenated radical left discourse in such fields as educational research (Carr and Kemmis, 1986), teacher education

CHAPTER 4

RESEARCH METHODOLOGY



CHAPTER 4

RESEARCH METHODOLOGY

4.1. Introduction

The results of a pilot study conducted in October 1994 to explore how the WNR could benefit the surrounding community showed the following:

- that broad-based consultation with the surrounding Mitchells Plain community, including the immediately-adjacent residents and users was needed to ensure the future conservation of the area;
- that teachers of schools surrounding WNR wanted to use WNR for environmental education and include these nature experiences into their curricula.

The above not only gave rise to the key research questions (see Chapter 1), but also provided the framework for the choice of research design. The socio-historical and educational context led me to decide on a quantitative-qualitative participatory research design process whereby:

- a broad cross section of the surrounding community and users could provide input into management issues and
- teachers could be empowered to identify how they could use WNR and participate fully in the development of curricular activities and materials to support these activities.

I was fully aware that there would be two components (social and educational) to the study and while their design approaches might be paradigmatically different, they would be the most appropriate to ensure that responses obtained would best be used to inform the conservation and development of WNR.

Firstly, I decided upon a participatory social survey design to explore the attitudes of local communities and the users of WNR. Secondly, I chose a research design for the educational component based on a conviction which I shared with other authors that the research needed to be “significant in the broad social context, ... build community.... and be of worth in classrooms” Lotz (1996), emergent (Tesch, 1989) and enabling (O'Donoghue, 1994). The approach also supports the position of Hall (1984) that participatory research should work towards social transformation that provides positive and direct benefits for people, especially in third world countries such as South Africa, and conditions such as in Mitchells Plain.

In this chapter I firstly describe the social survey component. I describe the methodology for the social surveys used for all three community groups, namely residents and community

Cape Town (see Appendix 1). The total sample size consisted of 200 residents and 100 community leaders. For the inter-community comparison, results from 31 Tafelsig residents were compared with those of 30 residents of Harare. This was because the proportional sample for Tafelsig was 31. For the user groups, 50 fisherfolk, 40 teachers, 50 pupils from secondary schools and 100 pupils from primary schools, all from Mitchells Plain, were chosen as the respondents.

Table 4.1. A total sample of 200 residents randomly drawn from an estimated Mitchells Plain population of 229 661 (Source: Census 1991).

Suburb	Estimated total population number	Proportional sample to a total of 200	Period over which survey took place in that suburb	Order in which survey took place
Mitchells Plain Suburbs				
Tafelsig	35274	31	31/3-19/5/96	1
Eastridge	21720	19	21/5-9/6/96	2
Beacon Valley	24459	21	13/6-25/6/96	3
Rocklands	28125	24	13/7-27/7/96	4
Strandfontein	16204	14	28/7-4/8/96	5
Lenteguur	33481	29	7/8-22/8/96	6
Woodlands	19743	17	7/8-26/9/96	7
Portlands	24940	21	1/9-2/10/96	8
Westridge	19915	17	14/9-30/9/96	9
Colorado	1340	2	4/10-8/10/96	10
Mitchells Plain central	40	1	9/10/96	11
Weltevreden Valley	4420	4	28/10-2/11/96	12
Khayelitsha Suburb				
Harare		30	25/2-21/4/97	13

The 200 residents, as well as those of Khayelitsha, were obtained in the following manner. For any suburb, e.g. Tafelsig, the principle was to randomly select the proportional sample plus five additional, random properties from the total sample. This ensured that any household that could not be interviewed could be substituted. The household was randomly elected from water meter records, as every property had its own water meter.

providing them an option to be interviewed in a morning, afternoon or evening session. Fifteen business leaders made use of this option and were interviewed at their places of work in either their morning or lunch time break. The remainder was interviewed in the 16h00 – 21h00 period and on weekends. At least two follow-up telephone calls were made to ensure that the interview would take place. A total of 150 letters were sent and 350 phone calls were made over the research period in order to coordinate the interviews for both groups, including the Khayelitsha group. Due to the limited number of the community leaders, I found it wise rather to reschedule an interview rather than make a substitution. A 98% response rate with 2 substitutions was therefore achieved for community leaders, which is considered very high by international standards (Babbie, 1973). In almost all cases, community leaders wanted information about Wolfgat as they felt that the nature reserve was an important environmental draw card to Mitchells Plain. Most felt that should the reserve be developed, it would bring economic benefit to the people of the area. Two remarked that they did not have faith in the local authority to develop the area, as it had taken so long for the area to gain any significance. They however still supported the survey.

For residents and community leader groups, as well as the Khayelitsha group, all interviews were conducted in either English or Afrikaans which were languages that were understood locally. Xhosa respondents all chose to be interviewed in either English or Afrikaans. Cards were also produced containing simplified captions for each question in English, Afrikaans and Xhosa so that respondents who had difficulty reading, could still respond independently. In the case of two Mitchells Plain respondents who were deaf (questionnaire numbers 47 and 63), an interpreter from that household assisted to ensure that the respondents made an independent choice.

The interviews were conducted in the following manner. Three persons formed part of the interview. The researcher, who read the questions out aloud, the respondent who had a copy of the questionnaire and a scribe who assisted the researcher by recording responses. After each question was posed, the scribe placed the set of cards (see examples in Appendix 3) on the table or flat surface in front of the respondent, who then could place the cards in order of importance. For example, where respondents had to rank their responses from most to least important, they would place them in that order on a table, and the scribe would record the response, gather the cards and the researcher would proceed with the next question. In one instance, in a very poor family, the interview was conducted on a bed which was placed in the lounge as 15 persons resided in the 60 m² house. To control “public relations” answers, questions were posed as neutrally as possible and cross-referenced to previous answers. Pilot testing of the questionnaires also helped to formulate the questions. As respondents were

were obtained and in all cases, a 100% response rate was achieved. This took place from 6 November 1996 to 17 February 1997.

4.2.4. Questionnaire design

4.2.4.1 Questionnaire for residents and community leaders

The questionnaire was designed over a period of five months from October 1995 to February 1996 following discussions with community leaders and residents. Consultations with experienced fynbos enviro-sociologist, such as Dr. Clive McDowell and environmentalist such as Dr. Farieda Khan, also helped to improve the questionnaire. Technical direction was obtained from authoritative works such as Babbie (1973), Churchill (1983) and Sudman and Bradburn (1983). A comparative study assessing the attitudes of business leaders and professional ecologists to conservation in South Africa (Preston, 1989) provided critical direction in the approach to this comparison at community level. Pilot testing was carried out on three residents in Tafelsig in March 1996 which revealed that the questionnaire was adequate for implementation. The complete community questionnaire is given in English in Appendix 4 and consisted of a number of different sections.

The cover page explained the purpose of the survey, clarified what was meant by a community leader, indicated the approximate length of the interview and re-iterated the need for honest answers.

The questionnaire was further divided into six sections. The rationale for its layout was to ensure that there was a move from questions which respondents could answer easily to more in-depth issues, ending with demographic information such as age, gender and occupation.

Section A: Relationship of respondent to Wolfgat

The objective of this section was to ascertain what issues were important to the respondent's quality of life and how Wolfgat could add to this. It also examined the nature of interaction that the respondent has had with Wolfgat and what impact Wolfgat could have on their life and those of the community. It ended by asking the degree to which community leaders cared about Wolfgat.

Section B: Utilisation of the Reserve

This section determined to what extent respondents would use Wolfgat in its present state compared to if it was upgraded to a standard, as determined by the respondent. It also

development and if, and to what extent Wolfgat had a role to play. The section on biographical data was placed last, as is recommended in several texts on social surveys (e.g. Churchill, 1983; Sudman and Bradburn, 1983).

In developing open and fixed-response categories, careful attention was to heed the advice of authorities such as Bailey (1978) and Sudman and Bradburn (1983). This was especially important during pilot testing where some questions (e.g. Should the local authority use the government's Reconstruction and Development Programme (RDP) funds to upgrade WNR?) was tested in open-format, but later converted to fixed-format, not only to save time, but also to allow respondents more ease in answering these questions. Time for clarification could thus be made where necessary. Sudman and Bradburn (1983) concur that more reliable results can be achieved using this method.

Careful attention was paid to the reliability and validity of the survey. The advice of an authority such as Albrecht and Thompson (1988) was heeded. The ability to replicate the study for residents and community leaders attests to the reliability of the study. These two groups are still the relevant people in the community to be consulted regarding any issues relating to Wolfgat conservation. The issues that were measured were defined in discussion with the same groups and enviro-sociologists. It is thus not only valid, but also measured what it set out to measure. These two elements of reliability and validity are central to the success of a social survey (Albrecht and Thompson, 1988). Internal consistency was established in the pre-and pilot testing and monitored throughout the survey.

A Likert scale (Strongly agree, Agree, Neutral, Disagree, Strongly disagree) (Churchhill, 1983) which did not include summated ratings (i.e. arbitrarily weighting of categories) was used to assist with internal consistency (Goode and Hart, 1952). Categories at both extremes were collapsed as it was felt that the intensity of the attitude was not as important as their agreement or disagreement with an issue. Furthermore, collapsing the categories allowed me to accommodate the cell-size requirements of test to be used which was Pearson's chi-square test (Siegal, 1956). Although "don't know" responses were not always shown in the analyses, they were usually merged with neutral for the purposes of this analysis.

4.2.4.3. Questionnaires for the user groups

The questionnaires for the user groups (Appendix 5) were designed and tested over a period of two months from September to October 1996.

Part B: User Specific Section

***For the fisherfolk**

Section A: Utilization was assessed by asking what type of fish, how many fish, and in which season fish were caught at Wolfgat. Where bait was obtained was also determined. In addition, a set of attitude statements were given to the fisherfolk to formulate an index of attitudes toward their fishing practice. This they answered to their strength of agreement by the following attitude level scores: 1 = strongly agree, 2= agree, 3 = disagree, 4 = strongly disagree, and 5 = don't know (Churchhill, 1983).

Section B: General views relating to permits, conservation of fish stocks, restrictions on fishing as well as future consultation with fisherfolk were explored.

***For the teachers**

Section A: This section explored what subjects are, and could be taught when visiting Wolfgat.

The kind of resources that were needed as well as the approach to resource development was investigated. Lastly, the factors which militated against teachers using WNR were also explored.

Section B: This section investigated the logistical challenges and support required when visiting the area. It also probed whether teachers wanted a resource centre and if yes, what resources it should house.

***For the Pupils: -- both primary and secondary schools**

Section A: Activities related to schooling, such as the subjects students preferred to be taught in Wolfgat and what projects they identified that could be done in Wolfgat were explored. A question was also posed as to what support they perceived they would require when doing these projects.

Section B: Activities not related to school, but which could be done in Wolfgat, were investigated. They were also asked how the reserve could be improved to make the activities enjoyable and why they thought WNR was important for the community.

identification of *Metalasia muricata* – family Asteraceae). For fauna scores, for example, a respondent who answered “bird” was scored at the family level of the Aves family, but scored at the genus level when they mentioned grysbuck (*Raphicerus melanotis*). Names of plants and animals were referenced using species lists as currently appearing in the Draft Environmental Management Plan for WNR (City of Cape Town, 2001).

4.2.6. Pilot studies

Pre-tests of specific sections were undertaken and both completed questionnaires were pilot tested three times. This was to ensure that the respondents would feel comfortable with the issues and questions and would be able to complete the questionnaire in approximately 1 hour. Care was taken not to use any respondents of the actual universes, although this could have meant that questions were not targeted as accurately as might have been the case using the actual respondents. The exercise, however, ensured that the questionnaire was well-honed and would work in the field.

4.3 Process and Methodology for the Education component

4.3.1. Providing a guiding framework for a participatory and enabling orientation

In this part of the research project, I wanted to draw upon a research design process that would produce and contribute to knowledge about the experiences (and empowerment) of teachers when being enabled to:

- (1) bring about educational transformation (change in the school curricula and in their teaching and learning practices) when using WNR;
- (2) participate in materials development processes that were democratic and contrary to the technically-imposed educational paradigm that prevailed in schools at the time; and
- (3) develop relevant (quality) education given that WNR was inextricably linked to the socio-historical context of local communities.

This design approach in this section emanates from the research questions and decisions on methods are based on this. I follow an approach where my choices of methods are related to the theoretical understanding as well as the theoretical constructs. In support of this, Fien (1992) notes that “methodology provides the philosophical framework that guides the research activity”.

According to Harding (1987), there are three constructs associated with the research process. These are epistemology (referring to the nature and status of knowledge), methodology (referring to the analysis of the research process) and methods (referring to techniques used to

cited in Lotz, 1996) as a process of deliberate enquiry, ideology critique and action aimed at improving both practice and the theoretical understanding of education. Gibson (1986) provides an introduction to critical theory and a review is given by Kincheloe and McLaren (1994).

This design approach would therefore support the collaborative process of action required to enable teachers to confront educational transformation and environmental educational practices (Savahl, 1993) that would lead to using WNR in a socially responsive manner. In the workshop programme where teachers explored how they could use WNR to transform their teaching practices, it also became clear that an action research approach with an emancipatory interest would be central to the research design. This approach is characterized by ongoing collaborative action and critical reflection, where the concept of praxis (Grundy, 1987) distinguishes it from interpretivist strategies. In the initial workshop programme, I thus attempted to transcend the relativism of the interpretivist tradition (McNaught and Raubenheimer, 1991) by placing the process of critical reflection and collaborative action at the centre of the research process (Lotz, 1996). Teachers are thus placed in a position to engage critically in education transformational practices, in order to gain a clear understanding of why and how they could use WNR. This process would then also explore the development of relevant curricula and materials. I will now go on to briefly define and describe action research.

The taxonomy of action research has led to three approaches being recognized in the literature (see Lotz, 1996 for review): the technical, practical and the critical approach. The first two approaches generally occur outside of the context of a research process. The (socially) critical (emancipatory) research approach allows teachers to explore opportunities to use WNR from a critical and engaged position and within the context of the social and educational constraints of schooling in Mitchells Plain.

Summarised briefly, the definition of action research derived from Carr and Kemmis (1986) and revised by Kemmis and McTaggart (1988), which would describe the emancipatory form of action research would be that:

“Action research is a form of active, collaborative, critical, (collective) self-reflective enquiry undertaken by participants in social (including educational) contexts in order to justifiably improve their own social and educational practices, their rational understanding of these practices, and the context wherein it takes place”.

4.3.2. Methods and data collection techniques

4.3.2.1 Methods

The study can be divided into three cycles of enquiry. Table 4.2 below provides a summary of the activities undertaken.

Table 4.2. Summary of activities with Primary and Secondary school teachers

Phase	Activity	Description	Period	No. participants	
				Primary	Secondary
1	Negotiating access to teachers	Liasing with teachers involved prior to study Visiting schools to gain access to teachers	Nov 1994 Dec 1994	3 36	1 15
2	Planning workshop programme	Planning and the introductory workshop Introductory field trip into WNR	Jan 1995 Feb 1995	38 20	9 10
3	The workshop (WS) programme	WS1- Planning for a workshop series	March 1995	17	5
3.1.	Teacher development	WS2- Introduction to fynbos; Overview, of WNR -its history, ecology, biology, conservation WS3- Field trip management; Excursion to WNR to assess localities and explore learning areas	April 1995 May 1995	18 68	4 3
3.2.	Curriculum development	WS4- Review and align syllabi, developing curriculum units & ecological audits; Issues of assessment WS5- Refining Curriculum units; Resource development; Planning for implementation in 1996	July 1995 Oct 1995	53 18	1 2
3.3.	Resource development	WS6-Finalising curriculum units and resource materials; Identifying phases of implementation for 1996	Nov 1995	9	2
4.	Reflection workshop	Reflection on workshops to develop themes out of trends from the workshops	Dec 1995	6	1
5.	Joint reflective planning	Develop interview schedule to reflect and critique implementation	Feb 1996	7	1
6.	Purposeful sampling	Three focus groups and 5 individual interviews, based on interview schedule developed in February 1996	March 1996	20	3
7.	Purposeful sampling	An enquiry involving an assessment of teacher responses to using WNR in their practice in the context of implementation of OBE	Aug 2001- May 2002	7	1
8.	Discriminate Sampling	One informal interview each concerning issues of education and WNR management policies	April 2005	1 education and 1 reserve manager	
Total number of interactions				380	

CHAPTER 4

RESEARCH METHODOLOGY



came from a quantitative scientific background with little knowledge of qualitative research methods. I was aware, however, of the “openly ideological” nature of research (Lather, 1986a), in particular of critical research processes. Fien (1992) notes that in action research, it becomes difficult to distinguish between theory and data, because data generation involves selections made by researcher and participants, implying judgements based on theoretical positions and experiences. I adhered to the advice of Elliot (1991; 1992), who notes that action researchers should make use of multi-techniques which should monitor both the process of implementation (action) and the effects, in order to provide evidence of the process and the intended and unintended outcomes.

4.3.2.2 Data collection techniques

The following section briefly describes the seven data collection techniques used. While these techniques were primarily used in cycle one, similar techniques were also used in cycle three.

- **Workshop summaries**

This technique proved most successful and was used as the primary technique. The majority of the research activities in Cycle 1 centred on the series of nine workshops run from 26 January 1995 to 6 December 1995. In the workshops, I tried to ensure that my role as facilitator resulted in inputs from group work, comments during feedback and plenary sessions and the development of collaboration between teachers. I also invited more knowledgeable speakers from the City Council as well as guides from the fynbos ecology fraternity, so that the workshops could achieve a balance between the presenting of information and interactive experience with WNR. This approach is in line with what McNaught and Raubenheimer (1991) and Hope and Timmel (1986) recommends for workshops. In conjunction with my personal journal, the workshops provided data in the form of summaries, field notes and samples of teachers’ work. At workshops, teachers were at all times allowed to absorb information via presentations or exhibitions whereafter they would jointly agree on the way forward, be it in process or content. For example, after workshop number 1 (referred to as WS 1 in the data chapter), teachers decided that they first needed an excursion into Wolfgat, as they could only then plan further, bringing context and their teaching practice together. Tape recording workshops assisted me to a degree as I could verify issues when producing workshop proceedings. Analyzing the proceedings was the first level of analysis I applied. After each workshop, the proceedings were circulated back to participants who would correct or amend them at the start of the next workshop which provided a second form of analysis. Informal discussions about workshop data with teachers provided a further means of analyzing the data.

During the post intervention assessment of part of the study in cycle three, a series of five workshops were conducted with five teachers from the original group from 6 August 2001 to 31 May 2002. Again, workshop proceedings, informal reflective discussions and teachers' stories (case studies) provided the means of data analysis.

- **Personal journal**

I kept a research journal from the commencement of cycle one to the end of cycle three of the study in 2002. In this I recorded all my thoughts on planning, my observations, feelings about the process and my own growth in qualitative research, reactions to research-related problems, ideas for solving them, informal meetings and discussions I had with teachers and colleagues. I also used it as a reflective tool to keep track of my progress and focus. I was able to use the journal as described by Meloy (1994) as a place where the researcher's role could meet methodological and analytical concerns. As researcher, I also found myself as part of the research process and a source of research data (Dudley, 1992). The journal thus assisted me in taking decisions around method and orientation over the research period.

- **Individual Interviews**

Purposive sampling (Cohen and Manion, 1989) of interview respondents was done to explore a diversity of responses to using WNR from "key respondents" (Marklund and Keeves, 1988) of representative primary and secondary teachers. This took the form of semi-structured interviews, conducted with a smaller sample of teachers after workshop 1, and again after cycle one. This provided a deeper understanding of teacher development, their participation, their practice, expectations and comments on the processes. While informal interviews were conducted with all five teachers of the August 2001-May 2002 workshops, it would not have been possible if I had not developed a relationship of trust, empathy and had shared interest, which Measor (1985; in Fien, 1992) recommends when conducting interviews. Measor (1985; in Fien, 1992) further notes that the quality of the data depends on the relationship of the researcher with the participating teachers, as was the case here. The ability to return to teachers after a period of time of 5 years had also been experienced by Lotz (1996) who was able to return to do follow-up interviews with teachers after two years after her first workshop. In all cases, teachers whom I interviewed also allowed me to use a tape recorder. Transcripts of all interviews were made and analytic memos were compiled to analyse the interviews. These were returned to the interviewees to check and interpretations of interviews with interviewees were done in most cases. A typical individual interview (example II 1) was no. 1) was conducted by appointment at the home of a teacher using the protocol of questions from Appendix 6. One teacher was interviewed immediately after she returned from an

excursion into WNR with her Grade 6's. These teachers were regarded as key informants in the process.

- Focus group interviews

After the cycle one workshops, I made use of focus-group interviews in order to provide me with feedback and critical reflection on the process and content of the workshops. I conducted three of these sessions, not more than one and half hours each as teachers met after school. Although I prepared a series of questions to guide discussions, the questions were adapted or extended when working with these groups. I always ensured that the sessions were moderated by someone not from the group, as suggested by Folch-Lyon and Trost (1981). In this case a Council official who was familiar with WNR moderated. I also experienced what Kritzinger (1994) found that when group dynamics went well, "participants acted as co-researchers taking the research to new and often unexpected directions, engaging in interactions that were complementary (such as sharing experiences) and argumentative (questioning, challenging and disagreeing with each other). This also affirmed Fien's (1992) notion that teachers hold their own personal theories about their practice. A typical focus group interview (example FG 1) setting was in the staff room of the school after school hours. It would be attended by teachers of different schools, or in one case, of the same school. Interviews focussed on gaining an idea of how teachers implemented learnings gained from the workshop programme in their practice, using the protocol of questions from Appendix 7. In many instances, teachers discussed issues amongst themselves and presented this as their joint response, as well as confirming the response of others.

- Photographs and newspaper articles

This provided visual data about situations and events. Although it can be argued that photographs are subjective and would only capture positive moments of the project, it did however provide data that illustrated milestones which teachers found they wanted to submit as part of this story. The newspaper articles published in the local community newspapers called *The Plainsman* and *Peninsula Times* were much more objective and provided a means to gauge what impact the educational project had on the awareness of the community. The writers of these articles also provided some evaluation of how successful the project had been up till that point. During the course of 1995, incidental discussions with community members indicated that the education programme caused many to regard WNR as a place for environmental education.

- Collections of documents

I collected documents relevant to the research questions throughout the research process. In Cycle One I collected documents such as school syllabi, textbooks, policy documents of current debates such as those for curriculum development, schemes of work, texts by Cowling and Richardson (1992; 1995) on Fynbos and my own annual progress reports for 1996, 1997 and 2001. In Cycle Three, I collected relevant documents on educational transformation (White Paper on Education and Training, 1995), Outcomes-based Education and Training (OBET, referred to as OBE), (Department of Education, 1997a;b), a text on "The Active-Learning model" by O'Donoghue (2001) and curriculum documents of the Western Cape Education Department. Minutes of meetings and planning schedules also provided an additional source of data. The approach to collect a range of documents relevant to the research issue is also supported by Elliot (1990). I constantly attempted to share these documents with teachers. While I analyzed and reviewed these documents for relevance to this study, they also became the focus in some of the group discussions.

- Participant observation to gain information from field trips to investigate learning opportunities and develop ecological audits

In all field trips, I tried to balance my role as participant and researcher. This Walker (1985; in Fien, 1992) also regards as important in establishing trust between researcher and project participants. The purpose of these trips was to investigate learning opportunities that could be integrated into the curriculum and to develop ecological audits which learners could use to monitor threats such as pollution and alien vegetation. Teacher fieldwork competence would also be improved by these audits. During these trips detailed observations were made and logbooks kept of the data. Secondly, initial investigative data was used to develop iterative procedures which would form a basis for ongoing studies to monitor these threats. In all cases, I took care to participate fully in the field trips as I was well aware that only collaborative enquiry with teachers would have the potential to find out if we were able to experience emancipatory action research.

4.3.3 Data Analysis

4.3.3.1 Collaborative participation in data analysis

From the initial planning of workshops, care was taken to involve teachers in all aspects of the research process. Teachers remained involved in the planning, analysis of workshop reviews shortly after the workshops, and decision-making around workshop content and the research agenda. As such, teachers became familiar with the context of the project, and jointly negotiated and decided upon the next steps which gave them joint control over the research agenda. These are conditions that Schenshul and Schenshul (1991) consider important when

doing emancipatory action research in a collaborative context. This research method also concurs with the suggestion of Robottom and Hart (1993b) that workshop participants should verify and amend data sources, such as workshop review reports, so that the research process becomes empowering and participants do not feel alienated from the process (Lather, 1986a). The fact that workshop reviews were done within two days and circulated to teachers to respond immediately allowed for joint decision making based on joint interpretations of the data. The systematic approach to decision making about the direction and content of future workshops was underlined by critical thought given to the issues in a local context. This reflected the reflective cycle of the action research process. Critical thinking remained central to the analysis of the data which Schensul and Schensul (1991) see as crucial to data analysis in a collaborative process. In workshop 2, I explained action research in detail to ensure that participants could take on participant researcher status after being empowered, which Schensul and Schensul (1991) consider a pre-condition to allow teachers to access the data.

Using a critical approach by involving and familiarizing all participants with the research focus allowed participants to raise questions from the data, analyze and interpret the data and provide feedback and confirmation of the emerging concepts (Fien, 1992). This process happened in the context wherein we found ourselves. Having identified the themes, participants could decide what to do next which is also an important feature of the reflective cycle of the action research process.

4.3.3.2 Data analysis process

This section provides a summary of the data analysis process. Workshop reviews were produced after each workshop and sent to teachers. They provided feedback which was then incorporated and validated in the successive workshop. This assisted the process in that decisions around the research agenda were based on inputs from participants at each successive step. I also shared interview summaries with interviewees and critically discussed issues raised with them. The record kept in my journal proved useful as I was collecting more and more data. I used the dates and notes in my journal to group the data systematically into files. I also shared these files with the five teachers of the planning team so that joint insights in the form of critical summaries (also referred to as analytical memos) were obtained which were shared with the larger group at the workshops. This allowed the research process to be empowering to the participants as well as evolving into a joint understanding of what the emerging issues were. These issues were taken to the workshops where they were shared and critically discussed in an attempt to validate the data and enhance or counter my interpretations. I did this to ensure that the analysis process remained collaborative and ensure that it was not only my own ideological position that would be reflected in the data analysis.

Summaries of the workshops, focus groups, individual interviews and transcriptions were used as the basis for data analysis and generating the emergent themes.

4.3.3.3. Using case records to organize the data

In order to remain organized, I heeded the advice of Professor Heila Lotz-Sisitska of Rhodes University Environmental Education Unit in South Africa, who advised that I collect and organize my data into data files (examples are reports, lists and correspondence) and analytical memoranda (examples are summaries of meetings, proceedings and discussions). A case record (CR) (Stenhouse, 1978) was developed from these documents and settings which was beneficial in that it represented the ordered and manageable data set which supports the main text of this report with validity and possibility for further critical review by others (Fien, 1992). Described as a theoretically parsimonious condensation of the case data, using selective editing (Stenhouse, 1978), a critical and reflexive presentation of the case record provides justification to the research report when it is cited and quoted.

4.3.3.4. Interpretation and Data analysis

Data interpretation and analysis was an ongoing process which involved ongoing reflective comments and decisions as part of the action research process. It involved interpretation in terms of a framework (the workshops), as well as coding data to develop categories of teacher responses during focus group and individual interviews, to using WNR during and following the workshop programme. I will briefly describe how the grounded theory method was used as a basis for the two processes, followed by a description of the analytical methods used in this study for the two processes namely: the workshop programme and teacher responses to using WNR in their practice.

** The use of the grounded theory method*

Grounded theory uses an inductive approach, based on a rigorous, systematic set of procedures for producing substantive theory of social processes, without any particular commitment to a theoretical interest (Glaser and Strauss, 1967; Schwant, 1997). In line with the principles of grounded theory, I did not set out to test any existing hypothesis, but explore teachers' responses and discover the emergent theory coming principally from teachers experiencing the educational process involving events which were pertinent and problematic to them. Using a participatory, flexible process, categories or themes would emerge which is characteristic of grounded theory research practices.

Grounded theory was used in this study as a basis to analyze two processes involved in this study, namely the workshop programme and the analysis and interpretation of teacher,

educational- and WNR management responses as presented in the focus group discussions and interviews. In this study, I followed a process involving eight overlapping phases of data collection. I also used my journal to record notes as a means of self-reflection on the process. I then used the method of constant comparison, initially comparing the first few interviews from the focus group discussions, and later from the individual interviews, making notes and developing categories with and from the data which addressed the research questions. I then followed the approach described by Reddy (2001) who used lexical items and phrases to develop categories and themes. The aim was, as with Reddy (2001), to allow for ways to assemble the disparate data into a whole (themes in my case) without creating the whole (themes) forcibly. The main recurring theme naturally becomes the centrepiece as the picture slowly emerges.

* The workshop programme

Much of the data on why and how to use WNR emerged from the workshops and my personal journal. Implementation challenges to using WNR emerged from the workshops, from participant-observation techniques when accompanying teachers on field trips into WNR, as well as from interviews I conducted with groups or individuals after these activities.

For the workshop programme, the conceptual framework developed by, and as described by Bell and Gilbert (1994) using grounded theory was used to interpret teacher development over the period of the study. These authors investigated New Zealand primary science teachers over a three year period who were challenged to change their roles and activities from a teacher-centred to learner centred approach. They described three categories of teacher development, namely professional (action and cognitive), personal and social development. This approach was also used by Reddy (2001) to analyze teachers' responses to curricular reforms in South Africa. In my study, data was analyzed to give an overview of teachers' learning and development over the period of the workshop programme using the categories and indicators developed by Bell and Gilbert (1994).

* Focus group discussions and interviews

All interviews were recorded onto audio-tapes, transcribed and summaries produced. Copies of the transcriptions and summaries were provided back to the teachers to verify the content and interpretations. These were used as the bases for further analyses. Interviews obtained from phases 6 to 8 were subjected to constant comparison, the data coded and categories developed from the data. I decided that the categories of responses of teachers to using WNR in a period of change would be based on similar studies such as categories developed by Shain and Gleeson (1999) in their study relating to teacher professionalism in the further

education sector in England, and those developed by Reddy (2001) in his study on primary school teachers' responses to Education policy reforms in South Africa. The categories used were those of resistance, compliance and support. As with Reddy (2001), I used explanations for these categories as developed in Reddy (2001), and interpreted the responses within each of these categories. Resistance is categorized as those responses negatively disposed to the change initiatives; compliance as a superficial acceptance of change where teachers implement what is needed without really believing or understanding the change or reform initiatives. Support is categorized as an open-minded acceptance of the reform and a willingness to attempt the implementation of the reform (Reddy, 2001).

4.3.3.5. Triangulation

Triangulation is a method for bringing contrasting data or accounts into relationship with each other (Elliot, 1991). The trustworthiness of data and interpretations can be checked, leading to greater validity of the research findings (Fien, 1992). By viewing the research from different perspectives, using different sources of data, methods and theories, researchers can self-monitor their project.

I used triangulation to compare methods as well as data sources. When comparing different methods of data collection, it became clear that the data from workshops could be compared to the data from interviews, but that the latter were more detailed. Comparing data from different data sources, such as from workshops compared to journal entries also seemed to enhance the data as the journal entries usually provided a more critical and reflective analysis by myself, as well as entries after discussions with teachers and the planning team.

Ongoing critical reflection allowed me, with the teachers, to progressively focus the issues (Vulliamy, et al., 1990), using the analytical memos, via the grounded theory method, into emerging themes. Literature reviews further enhanced my understanding of the emerging themes.

4.3.4. Validity, rigour and ethics

In seeking validity in action research, notable authors (e.g. Elliot, 1991; Lather, 1986b; and Winter, 1987; 1989) all agree that a critical account of the action research text should make explicit the implicit patterns contained within the work. Furthermore, validity is not achieved by trying to arrive at a definitive account of the situation, but that the situation should be seen as a continuous changing object of enquiry, opening up new possibilities for future action in the situation. In order to arrive at validity in a post-positivist research design, Lather (1986; cited in Lotz, 1996) argues that the minimum set of measures needed for validity are:

- Catalytic validity: which shows via documentation, as is provided in several investigations and case studies (see Chapter 5.5), that the research has led to insight and activism on the part of the participants;
- Face validity: which was established by involving the planning team to review emerging issues and themes;
- Triangulation of data and methods (see Chapter 5.5) in order to increase the trustworthiness of the data;
- Reflexive subjectivity: which seeks to provide evidence of how the logic of the data affected the researcher's assumptions (see Chapter 5.5).

In producing accounts of the workshops, field studies and analysis of interviews I tried to constantly remain self-critical, self-corrective, explicit about my interests substituting these for implicit interest in order not to dilute the trustworthiness and authenticity of the data (Lather, 1986b).

Carr and Kemmis (1986) sees rigour in action research as a situation where justifications for proposed actions are coherent as well as when the interpretations of the actions are coherent. In order to ensure rigour in this part of the research project, I made use of the following:

- Joint critical feedback from the planning team as well as the workshop participants on the direction of the research, interpretations of the processes and intended actions;
- Use symbolic description (Elliot, 1990) to describe situations in an honest and sincere way;
- Use Winter's (1989) principles of reflexive critique and dialectic critique (see Stevenson, 2000). The former intends to "open up arguments" so that other possible interpretations can be critically examined to modify the original claims. The latter provides for a method of data analysis by subjecting observed phenomena to a critique.

Conducting educational research in a post-1994 South Africa meant that as a researcher, I was faced with a situation where education as well as society was finding itself in a transition and transformation phase. Educators in schools felt that they could contribute to the transformation of curricula, and in turn to local social and environmental transformation. This was thus the ideal time to challenge forms of domination and power in schools where prior to this, most research in schools concentrated on doing research "on teachers as objects" in order to consolidate the RDDA approach to curriculum development. This project gave teachers the

opportunity to explore the use of WNR for environmental education through a reflexive process which challenges concepts of power and domination (Goodman, 1992).

In an attempt to ensure that the research was to be meaningful, mutually owned and socially transformative, I tried at all times to fully take up my role as a participant in the research and developed a relationship of mutual trust with all in the project. Elliot (1991) cautions that where trust is absent, the quality of data may suffer, while McNaught and Raubenheimer (1991) note that trust is an essential element of action research. I approached all situations with honesty and respect for all teachers involved in the project. This required intersubjectivity (Laurelia, 1996) where I approached each interaction with the assumption "that teachers had something of value to contribute, opinions and experiences worth talking about". I ensured that I obtained their permission for collection of the data as I as the researcher was important in generating the text for ongoing interpretation. By remaining self-reflexive, I was aware that my practical knowledge interacted with teachers' practical knowledge and that this resulted in an interactive research process where differences in meaning could arise. I welcomed these interactions in what Fien (1992) calls "dialectical confrontations producing intersubjective meanings". I strove to share each decision, shared workshop and initial interpretations of data, and was transparent about how the project was funded (I had received a substantial grant which funded workshop materials, excursions and food). Why, how and for what reason data was collected, as well as sharing all data production and analyses were shared. This transparency of data collection and analyses were important as Punch (1986) considers it central to integrity in research.

At the start of this study, I was myself a teacher of Grade 8-12 pupils, and on study leave for the year. This made it easier to visit schools and interact with teachers as they felt that I understood their situations fully than would an academic researcher without any classroom experience. I thus easily took up the role as full participant, facilitator, co-researcher and co-learner who could provide support for empowering teachers to use WNR in their curricula and develop curriculum materials to be used in WNR. Although there was the potential for inequality and domination, I strove to remain self-reflexive remaining in the role of a co-respondent participant, responsible for action as much as any other participant in the research (Fien, 1992).

4.4 A Note on Data Management

In this project, a large amount of data was collected and produced by way of various research methods described earlier. The data management process included the systematic reduction of a large amount of data in terms of the questions that were selected and the conceptual

CHAPTER 5.4

USAGE, PREFERENCES, PERCEPTIONS AND KNOWLEDGE OF FOUR USER GROUPS OF THE WOLFGAT NATURE RESERVE



approach. Only the data relating to the research questions were included in the data set that formed part of the interpretation and analysis.

4.5. Concluding comments

This chapter has provided an overview of the methods and processes to explore what approaches would best indicate the beneficial value of WNR for local communities, users and teachers from local schools. Participatory and collaborative orientations have been shown to be critical in the socio-historical and educational contexts of this research study.

Having collected all the data in both components, I now move forward to introduce the data in Chapter 5.1. I then go on to analyze and report on my findings in four studies in Chapters 5.2 to 5.5. In Chapter 6, I summarize my key findings and explore possibilities for further research.

CHAPTER 5

COMMUNITY CONSERVATION AND ENVIRONMENTAL EDUCATION RESEARCH DATA



CHAPTER 5

COMMUNITY CONSERVATION AND ENVIRONMENTAL EDUCATION RESEARCH DATA

5.1. Introduction

Research data for this project was collected over a continuous period of 27 months (January 1995 to March 1997) and then again for a further 10 months (August 2001 to May 2002), a total of 37 months. Data for the community part of the project was collected over one year from March 1996 to March 1997 by conducting personal interviews with 601 respondents (451 adults and 150 school going youth) from different community groups. Data for the educational part of the project was collected over an initial period of 15 months from January 1995 to March 1996, and a post-intervention enquiry over 10 months from August 2001 to May 2002. This involved 380 interactions primarily with teachers as well as education and nature reserve managers. These are presented as individual studies, each within its own context. In each community study, the results starts with a summary of the socio-economic features of each group, while in the education study, an overview of the interactions are provided in Chapter 4, section 4.3.2.1. These summaries provide a contextual environment within which each study took place.

The first study on residents and community leaders was conducted over an eight month period across all suburbs of Mitchells Plain. Interviews with residents in study one and two were done from late afternoon to early evening and over weekends when there was sunlight. This was done to avoid any chance of encountering crime. This resulted in a maximum of 3 interviews per evening or 5 interviews per day over a weekend. Interviews with community leaders were done after confirming an appointment via telephone.

The second study on immediately adjacent residents from different cultural communities entailed taking the sub-sample of the closest Mitchells Plain suburb of Tafelsig and comparing them with a similar sized sample of residents of the closest Khayelitsha suburb called Harare. As the Tafelsig sample was the first to be completed in the previous study, the Harare sample was only interviewed after the first study was completed. With logistical constraints such as substitutions and safety concerns, this study was done over 60 days.

CHAPTER 5.2

ATTITUDES OF RESIDENTS AND COMMUNITY LEADERS OF THE SURROUNDING MITCHELLS PLAIN COMMUNITY TO THE CURRENT AND FUTURE ROLE OF WOLFGAT NATURE RESERVE



CHAPTER 5.2

ATTITUDES OF RESIDENTS AND COMMUNITY LEADERS OF THE SURROUNDING MITCHELLS PLAIN COMMUNITY TO THE CURRENT AND FUTURE ROLE OF WOLFGAT NATURE RESERVE

1. Introduction

As community leaders primarily represent residents in local and decision-making regional forums and speak on their behalf, it is important that their views reflect those of the residents they represent. A central issue in this study was to determine what each group perceived to be: WNR's role in its current and upgraded state; its role in relation to the socio-economic development of the surrounding communities; and crucial conservation and management issues. The latter entailed determining the attitudes of each group to WNR conservation, perceptions of the management authority and community involvement in management of the area. The degree of agreement within and between these two groups on these issues was also determined. In support of the above, a summary of the socio-economic features of each group is initially provided. The survey thus assessed factors associated with (1) the perceived threats to the utilization of WNR in its current state; (2) perceived utilization practices if upgraded; (3) funding towards its conservation. The above is discussed in order to assist WNR and other lowland fynbos PA managers to set management priorities for the future conservation of WNR and other lowland fynbos areas.

2. Methods

2.1 *Study context and data analysis*

The general approach and specific methods for this study on residents and community leaders is described in detail in Chapter 4, sections 4.2.1 and 4.2.2. Briefly, this study involved a comparative questionnaire survey of the attitudes of 200 residents and 100 community leaders living in the community of Mitchells Plain, surrounding the Wolfgat Nature Reserve. Data for this study was obtained by analyzing sections a,b,c,d,e,f of the community questionnaire (see Appendix 4). Statistical methods and data analyses used are described in Chapter 4, section 4.2.5.

3. Results

3.1. Socio-economic features of residents and community leaders

Socio-economic features of residents and community leaders interviewed are provided in Table 5.2.1.

Table 5.2.1. Summary of key socio-economic features obtained from this study of residents and community leaders of the Mitchells Plain community, the township bordering the Wolfgat Nature Reserve. Percentages shown for residents only, as leaders totals equal 100.

Variable	Residents (n=200)	No	%	Community Leaders (n=100)	No
Predominant language	English Afrikaans English/Afrikaans	23 88 89	11.5 44 44.5	English Afrikaans English/Afrikaans	18 45 37
Mean age	37.8 years (± 12.1) (range 18-76)			41.7 years (± 11.9) (range 18-69)	
Gender	Male Female	96 104	48 52	Male Female	64 36
Occupation	Skilled Semi-skilled Unemployed	46 66 88	23 33 44	Skilled Semi-skilled Unemployed	74 13 13
Mean Residence time	10.4 years (± 5.7) (range 1-25)			10.8 years (± 6.7) (range 1-31)	
Highest Education Level	Primary school Secondary school 3 year diploma/degree Honours degree Masters degree Doctors degree	116 68 16 0 0 0	58 34 8 0 0 0	Primary school Secondary school 3 year diploma/degree Honours degree Masters degree Doctors degree	18 51 24 1 4 2
Level of income	<R800 per month R801-R3000 per month R3001-R6000 per month >R6000 per month	39 127 29 5	19.5 63.5 14.5 2.5	<R800 per month R801-R3000 per month R3001-R6000 per month >R6000 per month	8 35 37 20
Affluence ¹	Rich Comfortable Poor	3 146 51	1.5 73 25.5	Rich Comfortable Poor	20 75 5
Studied Biology at school	YES NO	78 122	39 61	YES NO	43 57
Watch conservation programmes on television	YES NO	167 33	83.5 16.5	YES NO	87 13
Awareness of WNR	YES NO	111 89	55.5 44.5	YES NO	50 50
Previously visited WNR	YES NO	49 151	24.5 75.5	YES NO	25 75
Mean Household size	4.5 (± 2.4) (range 1-22)			3.9 (± 2.7) (range 1-14)	
Sector affiliation	Not applicable			Community based/ Civic organization Political Health & Wel fare Local business Religious Education	51 21 18 6 2 2

¹Affluence is determined as follows: Rich = households who owned a recent model car, had 3 bedrooms, television, washing machine, fridge, stove, Hi-fidelity equipment; Comfortable = households with a car, had 2 bedrooms, television, radio, fridge; Poor = households with 1 bedroom, 2 plate stove or primus stove, fridge, radio.

In both groups, similarities were reflected in the following: (1) about 45% spoke the Afrikaans language as their dominant language, (2) mean resident time in Mitchells Plain was about 11 years, (3) about 40% had studied Biology at school, (4) about 85% watched conservation programmes on television, (5) about 50% were aware that WNR existed, (6) about 25% had previously visited WNR, and (7) mean household size was about 4 persons. Differences between the two groups were revealed in the following: (1) There were more males than females in the community leader group while the proportion of males (48%) and females (52%) in the resident group were similar. (2) There were markedly more skilled, higher education levels, higher income, and more affluent persons in the community leader, than in the residents' groups. The higher proportion of community leaders holding a secondary (51%) and tertiary (31%) education, compared to residents holding a secondary (34%) and tertiary (8%) education provide a good basis for the difference in occupation, income and affluence. Just over half of the community leaders belonged to community-based or civic organizations comprised of resident and ratepayers associations. About one fifth belonged to political parties or Health and Welfare organizations.

3.2. Current and future role of the reserve

3.2.1. Current role if not upgraded

3.2.1.1. Frequency of present use

In its present state (Fig. 5.2.1), a higher proportion of residents (67%) felt more strongly than community leaders (44%) that they would never use the reserve. Of the 33% residents and 56% community leaders who would use the area, about one fifth (20%) of residents and about one third (30%) of the community leaders would use the area infrequently (once or twice per year).

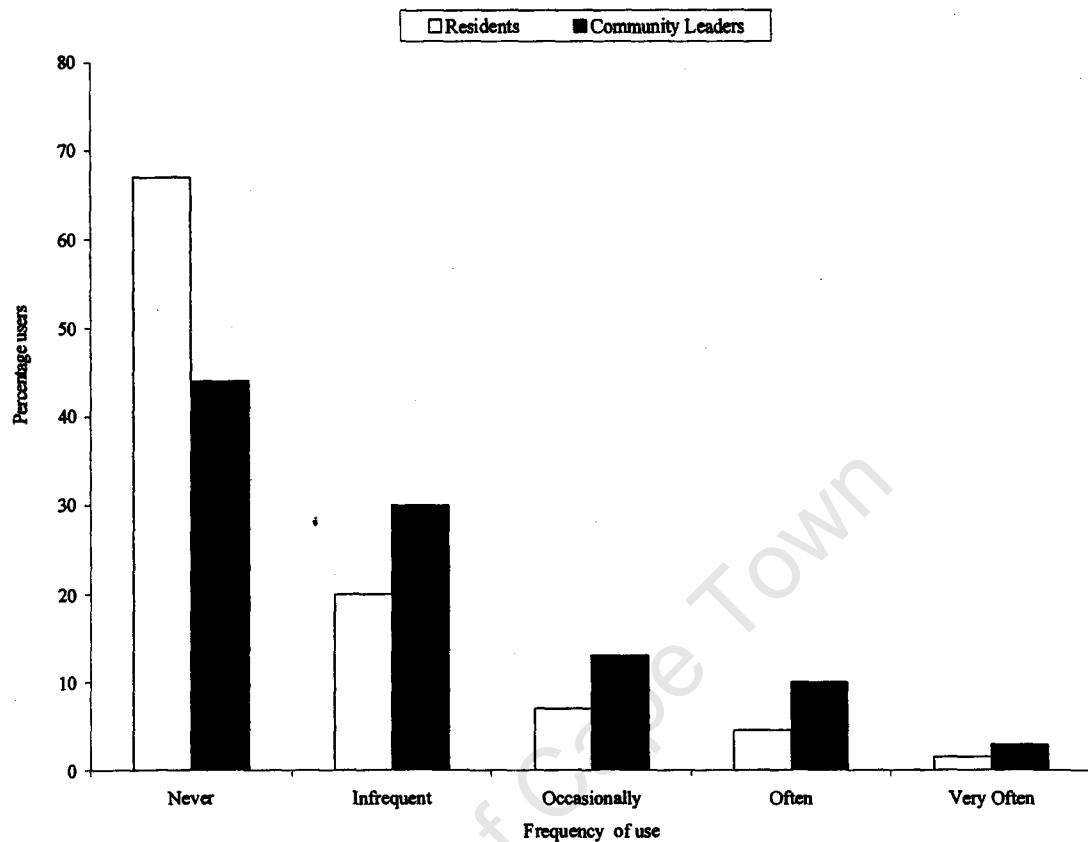


Figure 5.2.1. Perceived frequency of use of Residents ($n=200$) and Community leaders ($n=100$) for the Wolfgat Nature Reserve in its current non-upgraded state. Significance level between residents and community leaders calculated using sign test for between groups: $P=0.83$ (d.f.= 4). Note that frequency categories are: Infrequently = once/twice per year; Occasionally = once every three months; Often = one to three times per month; Very often = once per week.

While 69% of residents and 59% of community leaders did not provide reasons why they would or would not visit the area, those who provided reasons are shown elsewhere (see Appendix 8, Box 1). In both groups, 7% would use the area to enjoy nature and 2% for educational outings. Walking, hiking and relaxation was mentioned by 7% of the residents and 13% of the community leaders as other reasons for using the area. In both groups, 14% provided negative comments that the reserve was unattractive due to no facilities such as

toilets and taps, while 1% residents and 5% community leaders indicated that the bushiness of the alien plants made it appear unsafe.

3.2.1.2. *Reasons for staying away*

Both groups felt that dangerous gangs/crime and rubbish dumping in WNR were the first and second most important drawbacks that kept them from using the area (Table 5.2.2). In both groups, dangerous gangs/crime was not ranked significantly higher than rubbish dumping. Residents felt that dangerous gangs/crime was significantly more important ($P < 0.05$) in keeping them away than the lack of information. Community leaders on the other hand felt that the lack of information was just as important in keeping them from using WNR as was dangerous gangs/crime.

Table 5.2.2. The rank order of importance of six factors that currently prevent Residents ($n=200$) and Community Leaders ($n=100$) from using the Wolfgat Nature Reserve. Values are expressed as a percentage and rounded up. Significant differences between factors within Residents and Community Leaders are calculated using the Wilcoxon-matched pairs test and in each case are compared with the most important factor preventing use i.e. "Dangerous gangs/crime". NS= not significant, * $p < 0.05$, ** $p < 0.01$.

Factor preventing use	Residents							Community Leaders						
	1st	2nd	3rd	4th	5th	6th	P	1st	2nd	3rd	4th	5th	6th	P
Dangerous gangs/crime	48	26	13	8	3	4	---	35	21	20	14	6	4	---
Rubbish dumping	18	23	19	18	18	6	NS	16	16	19	27	16	6	NS
Lack of patrols	10	25	29	23	9	6	NS	8	39	22	12	10	9	*
Reserve is bush	7	14	16	21	26	18	*	5	8	15	22	37	13	*
Lack of information	15	9	18	23	24	13	*	30	12	18	17	15	8	NS
Belongs to City Council, not us	3	6	6	10	22	55	**	6	4	6	8	16	60	**

The overwhelming majority of residents (98%) and community leaders (99%) felt that these drawbacks could be solved. Forty six percent of residents and 41% of community leaders recommended that patrols be employed to monitor crime and dumping (Appendix 8, Box 1). Residents supported removing the alien plants via a job creation programme (27% of respondents) and conducting an education programme to raise awareness in the local community (15% of respondents) as their second and third most favoured recommendations to solve these drawbacks. Community leaders proposed fines for dumping (20% of respondents) and an education programme to raise awareness (17% of respondents) as their

None of the selected factors significantly influenced community leaders' opinion of rubbish dumping, lack of patrols or the bushiness of WNR as threats to using WNR. For residents, gender and having previously visited WNR were significantly positively related to whether or not residents gave a positive opinion as to whether rubbish dumping or the bushiness acted as a drawback to them using WNR. While males appeared ambivalent to rubbish dumping and the bushiness, female residents (66%) felt that rubbish dumping and the bushiness (78%) was a threat to them using WNR. Residents who had previously visited WNR felt more strongly that rubbish dumping was a threat to them using WNR, while those who had not previously visited felt that rubbish dumping was not a threat to them using WNR. A significantly higher majority of residents who watched television, which featured conservation issues, than those who did not watch television, were of the opinion that the lack of patrols would not deter them from using WNR.

For residents, occupation, educational level and income were significantly related to whether a resident gave a positive opinion or not, if the lack of information acted as a drawback in using WNR. Only educational level significantly influenced community leaders opinions as to whether the lack of information would act as a drawback to them using WNR. For residents, a significantly higher majority in all occupational and educational categories did not feel that the lack of information acted as a drawback in keeping them from using WNR. While a significantly higher majority in all income categories up to R6000/month did not feel that the lack of information acted as a drawback, more residents in the income category above R6000/month felt that the lack of information did act as a drawback in keeping them from using WNR. The majority of community leaders who had a secondary school level education felt that the lack of information was not a drawback while the majority with a tertiary level education felt that the lack of information did act as a drawback in them using WNR.

3.2.2. Potential future role if upgraded

3.2.2.1. Frequency of future use

Should Wolfgat be developed (Fig. 5.2.2), 98% of residents and 100% of community leaders would use WNR at various levels of frequency. When combining often and very often, nearly 75% of the resident group and 87% of the community leader group would use WNR at least once per month.

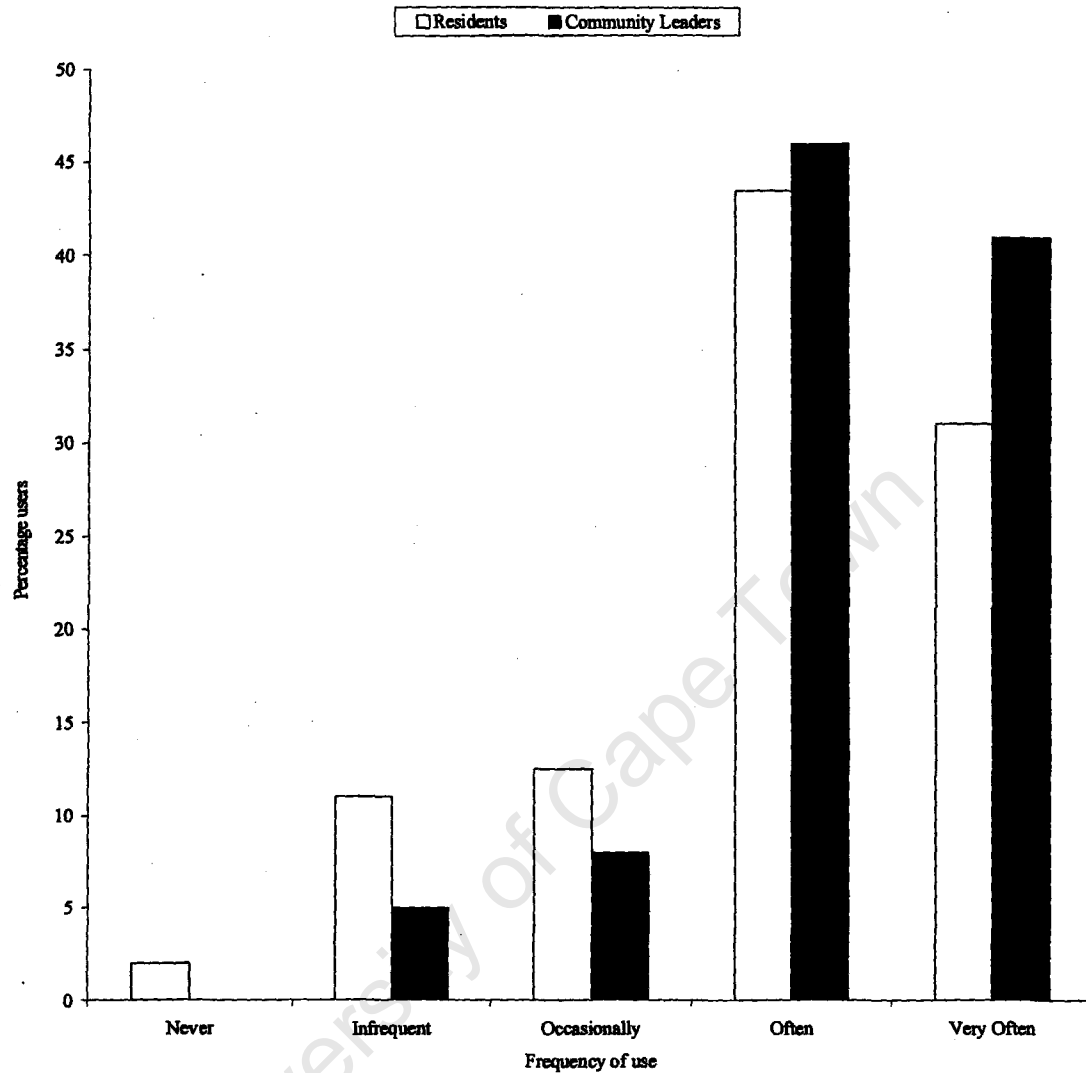


Figure 5.2.2. Perceived frequency of use of Residents ($n=200$) and Community leaders ($n=100$) for the Wolfgat Nature Reserve should it be upgraded. Significance level between residents and community leaders calculated using sign test for between groups: $P=0.07$ (d.f.=4). Note that frequency categories are: Infrequently = once/twice per year; Occasionally = once every three months; Often = one to three times per month; Very often = once per week.

3.2.2.2. . Perceived utilization if upgraded

When asked to rank non-consumptive uses of the area, both residents and community leaders ranked Environmental Education, Nature protection, relaxation/scenery, Recreation and Birdwatching as their first to fifth preferred environmental uses of the area (Table 5.2.4). In both groups, Environmental Education was not ranked significantly ahead of Nature Protection, but significantly ahead of the other issues. When comparing residents and community leaders, a higher percentage of community leaders (49%) compared to residents (41%) ranked Environmental education first.

Table 5.2.4. The rank order of importance of five non-consumptive uses if Wolfgat were upgraded should Residents ($n=200$) and Community leaders ($n=100$) plan developments. Values are expressed as a percentage and rounded up. Significant differences between factors within Residents and Community Leaders are calculated using the Wilcoxon-matched pairs test and in each case are compared with the most important non-consumptive use i.e. "Environmental education". NS= not significant, * $p<0.05$, ** $p<0.01$.

Non-consumptive use	Residents						Community Leaders					
	1st	2nd	3rd	4th	5th	P	1st	2nd	3rd	4th	5th	P
Environmental education	41	35	12	9	5	---	49	37	10	3	1	---
Nature protection	41	21	19	12	8	NS	40	30	17	6	7	NS
Relaxation/scenery	10	18	33	24	15	*	7	11	30	26	26	**
Bird watching	3	13	13	28	44	**	1	9	22	25	43	**
Recreation	6	14	24	28	29	**	3	13	21	40	23	**

Both groups ranked eco-tourism as the primary consumptive use they preferred (Table 5.2.5). The use of eco-tourism as a consumptive use needs to be clarified. Respondents in the pilot study as well as in the survey felt that the kind of eco-tourism that they wanted for the area was to include consumptive activities such as a lodge facility and horse-back riding to generate income, in the reserve. Both groups ranked a playpark and a campsite as either their second or third preferred consumptive uses (Table 5.2.5). In each group, support for eco-tourism did not differ significantly from support for using WNR for a playpark. Respondents in both groups who supported using WNR for a playpark clarified this by indicating that they only wanted a portion near the houses to be used as a playpark. In each group, ecotourism enjoyed significantly higher support than the other consumptive uses.

Testing for internal consistency again proved that both groups preferred eco-tourism when both groups agreed that "it is likely that tourists who visit Wolfgat will benefit our community" (Residents =95% and Community leaders 90%, $P = 0.15$).

Table 5.2.5. The rank order of importance of eight consumptive uses if Wolfgat were upgraded should Residents ($n=200$) and Community Leaders ($n=100$) plan developments. Significance values within each group calculated using the Wilcoxon-matched pairs test. Within each group, comparisons between consumptive factors were carried out relative to "Eco-tourism". Analysis for each group was carried out on the first to fourth choices only. NS= not significant, * $p<0.05$, ** $p<0.01$, *** $p<0.001$. Nsup = indicates frequency of "no support for that particular use".

Consumptive use	Residents						Community Leaders					
	1st	2nd	3rd	4th	NSup	P	1st	2nd	3rd	4th	NSup	P
Eco-tourism	40	24	17	6	15	---	42	11	8	7	32	---
Camp site	11	27	41	4	19	*	7	26	23	4	40	*
Play park	27	34	26	2	13	NS	16	15	25	5	39	NS
Initiation site	0	1	1	3	96	***	1	4	2	5	88	**
Soccer field	3	3	4	3	89	***	0	0	0	7	93	***
Caravan Park	9	6	5	6	76	**	1	5	7	7	80	**
Housing	7	0	4	1	89	**	0	3	0	2	95	***
Golf course	3	2	1	2	93	***	0	1	3	4	92	***

3.2.2.3. *Facilities to be developed and how they would benefit the community?*

When asked what facilities should be developed to encourage usage, if kept as a nature reserve, the majority of residents (73%) and community leaders (72%) suggested an information centre with toilet facilities, curio shop and a museum (Appendix 8, Box 1). They further differed on how it will primarily benefit the community. Residents indicated employment (36%) while community leaders indicated recreation (41%). About twice the percentage of residents than community leaders thought it could benefit the community by providing environmental education opportunities for local schools (residents = 20%, community leaders 9%), and as a place for family outings (residents = 12%, community leaders 6%), (Appendix2, Box 1).

3.2.2.4. *Factors to be monitored in future to encourage ongoing usage*

When asked "what factors should be checked (monitored) to encourage your ongoing usage", residents rated crime, provision of regular patrols and ongoing information as their first to third most important concerns (see Appendix 8, Box 2). Crime was not rated significantly different to patrols ($P=0.73$, d.f.= 6) or ongoing information ($P=0.61$, d.f.= 6), while patrols were not perceived as being significantly different from ongoing information ($P=0.91$, d.f.= 6). Community leaders rated provision of ongoing information, regular patrols and combating crime as their first to third most important concerns. They did not rate patrols significantly ahead of ongoing information ($P=0.93$, d.f.= 6) or crime ($P=0.86$, d.f.= 6), nor was ongoing information rated significantly ahead of crime ($P=0.93$, d.f.= 6).

3.2.2.5. Factors influencing perceived utilization practices in WNR if upgraded

When testing factors such as utilization practices as the dependent variable and socio-economic variables as independent variables, results showed that for the residents group, educational level, income, having studied Biology at school, awareness and having previously visited WNR were significantly related to whether residents intended to use the area for environmental education (Table 5.2.6). A higher proportion of residents with a secondary and tertiary education expressed more positive attitudes towards using WNR for environmental education than those with a primary education. A higher proportion of residents who earned >R3000 were more positive towards using WNR for environmental education than those who earned <R3000 per month. A higher proportion of residents who had studied Biology at school were more positive towards using WNR for environmental education than those who had not studied Biology. A higher proportion of residents who were aware and who had visited WNR previously were more positive towards using WNR for environmental education than those who were not aware, or who had not visited before. For the community leader group, a significantly higher proportion of each sector other than the business sector, were more positive towards using WNR for environmental education than those who were affiliated to the business sector.

Table 5.2.6. Results of χ^2 tests for eight socio-economic factors associated with perceived utilization of WNR if upgraded, by Residents ($n=200$) and Community Leaders ($n=100$). Significance values; NS= not significant, * $p<0.05$, ** $p<0.01$.

Utilization Practice	Sector -CBO -political -health -business -religious -education	Gender - male -female	Residence Time -years	Educational Level -primary -secondary -tertiary	Studied Biology at School -yes versus no	Income -R0-800 -R801- 3000 -R3001- 6000	Awareness yes versus no	Previously visited WNR -yes versus no
<i>Environmental Education</i>								
-Residents	N/A	NS	NS	6.7 *	4.7 *	8.1 *	5.7 *	6.6 *
-Community Leaders	14.8 **	NS	NS	NS	NS	NS	NS	NS
<i>Recreation</i>								
-Residents	N/A	NS	4.2 *	NS	NS	NS	NS	NS
-Community Leaders	14.8 **	NS	NS	NS	NS	NS	NS	NS
<i>Relaxation/Scenery</i>								
-Residents	N/A	8.6 **	NS	NS	NS	NS	NS	NS
-Community Leaders	12.5 *	NS	NS	7.5 *	NS	NS	NS	NS

Residence time was significantly related to whether residents intended to use the area for recreation. A significantly higher proportion of residents who lived in the community for more than 11 years were more negative towards using WNR for recreation than those who lived <11 years in the community. For community leaders, belonging to a specific sector was significantly related to whether community leaders intended to use the area for recreation. Community leaders who belonged to the CBO, political, health and welfare, and religious sectors were more negative towards using WNR for recreation than those who belonged to the business and educational sectors.

Gender was significantly related to whether residents intended to use the area for relaxation/scenery. A significantly higher proportion of male than female residents were more negative towards using WNR for relaxation/scenery. For community leaders, sector affiliation and educational level were significantly related to whether community leaders intended to use the area for relaxation/scenery. Community leaders belonging to the business sector expressed more positive attitudes towards using WNR for relaxation/scenery. All the other sectors expressed more negative attitudes towards using WNR for relaxation/scenery. A significantly higher proportion of community leaders with a secondary and tertiary education expressed more negative attitudes towards using WNR for relaxation/scenery than those with a primary level education. None of the selected factors influenced residents' or community leaders' opinions towards uses such as nature protection or bird watching.

3.3. Prioritization and the role of Wolfgat in relation to local community development themes and factors influencing funding towards its conservation

3.3.1. Prioritization of WNR

3.3.1.1 *When allocating R1million towards community development themes*

Respondents were asked to consider the scenario where the Reconstruction and Development Programme (RDP) of the government granted R1 million for development in the Mitchells Plain/Khayelitsha area and make a choice as to how they would guide allocation of such funds. Table 5.2.7 shows how each group wanted this money allocated.

Residents allocated the highest amount to Job creation, followed by housing, education, health and welfare and Wolfgat conservation in fifth place. The first three options were allocated significantly more funds than Wolfgat conservation while allocation to Health and Welfare and Wolfgat conservation were not significantly different. While Wolfgat conservation allocation was higher, albeit not significantly higher, than crime, it was significantly higher than the remaining eight community development options.

Community leaders allocated the highest amount to Job creation, followed by housing, health and welfare, education and Wolfgat conservation in fifth place. Of these mentioned, only Job creation was allocated significantly more funds than Wolfgat conservation. Community leaders allocated a similar amount to Wolfgat conservation and crime prevention. Allocations to Wolfgat conservation were significantly higher than the remaining eight community development options.

Table 5.2.7. Proposed average (\pm std. dev.) allocation per 14 community development options from a total of R1 million (Allocation in '000's) prioritized by Residents ($n = 200$) and Community Leaders ($n = 100$). Significance values calculated using the sign-test to compare differences within each group relative to "Wolfgat conservation". The sign test was then again used to compare differences between residents and community leaders, per development option. NS= not significant, * $p < 0.05$, ** $p < 0.001$, *** $p < 0.0001$.

Community development theme	Residents			Community leaders			P between
	Mean	SD	P within	Mean	SD	P within	
Housing	139	119	*	161	162	NS	NS
Education	138	106	*	125	90	NS	NS
Job creation	152	129	*	165	107	*	NS
Wolfgat conservation	113	107	---	115	97	---	NS
Health and Welfare	120	88	NS	128	109	NS	NS
Crime	99	86	NS	97	85	NS	NS
Social Development (Food for needy)	78	78	**	48	58	*	NS
Building materials	26	57	***	10	41	**	*
Religious buildings	41	59	**	7	26	**	*
Transport	32	51	***	41	111	*	NS
Small business development	20	41	***	57	87	*	*
Burial grounds	23	47	***	18	46	**	NS
Eco-tourism	19	46	***	20	42	**	NS
Adult Basic Education and Training	0	0	***	8	58	**	**
Totals	1000			1000			

Comparing allocations for each option between the two groups, revealed four significant differences. Residents made significantly higher allocations to building materials and religious buildings. Community leaders made significantly higher allocations to small business development and Adult Basic education and training. There was no significant

difference in allocation to Wolfgat conservation by residents and community leaders, as both groups allocated about 11% of the total budget to Wolfgat conservation.

3.3.1.2. When ranking the area in relation to other community development themes

When respondents were asked to “rank only the eight greatest priorities for allocating R1 million for community development” by using graphically illustrated cards (see examples in Appendix 3), residents ranked Housing, Job creation, Health and Welfare, Education and Crime prevention as their first to fifth preferred options (see Appendix 9). Wolfgat conservation was ranked sixth. Although residents did not rank the above options as well as Food for the needy significantly ahead of Wolfgat conservation, WNR was ranked significantly ahead of the remaining six themes namely, transport, building material, religious buildings, burial grounds, small business development and eco-tourism.

Community leaders ranked Job creation, Housing, Health and Welfare, Education and Crime prevention as the first to fifth most important community development issues (Appendix 4). Wolfgat conservation was again ranked sixth although the top five were not ranked significantly ahead of Wolfgat. As with the residents, community leaders also ranked Wolfgat conservation significantly ahead of the remaining seven themes.

When exploring why respondents sequenced the community priorities in this manner, responses were generally centred around the above options to improve the quality of life. Statements which reflected this were; “Unemployment is high and job creation will solve other needs” (Residents = 12%; community leaders =30%), “education provides a basis for a good future” (Residents = 16%; community leaders =15%), as well as “WNR should be upgraded so that it can be used for education and tourism” (Residents = 5%; community leaders =4%) (see Appendix 10). Testing the perception that if the upgrading of WNR would improve the quality of life in Section A of the questionnaire revealed that residents felt significantly more strongly ($P=0.01$) than community leaders that upgrading WNR would improve the quality of their lives.

3.3.2. With which community priorities could Wolfgat help and how could it help?

When asked “with which options can Wolfgat help?” both groups identified four of the available fourteen options with which WNR could help. Both groups ranked Employment, Education and Health and Welfare and small business development first to fourth (Table 5.2.8).

Table 5.2.8. The rank order of importance of four development options in which Residents ($n=200$) and Community leaders ($n=100$) see Wolfgat playing a role. Values are expressed as a percentage and rounded up. Significant differences between factors within Residents and Community Leaders are calculated using the Wilcoxon-matched pairs test and in each case are compared with the most important option with which WNR can play a role i.e. "Employment". NS= not significant, $*p<0.05$.

Development option with which WNR could help	Residents				Community Leaders			
	1st	2nd	3rd	P	1st	2nd ^d	3rd ^d	P
Environmental education	52	32	16	NS	37	45	18	NS
Employment	65	23	13	---	70	19	11	---
Health and Welfare-(relaxation for mental health & physical fitness)	40	37	24	NS	27	29	44	NS
Small business development	9	29	63	*	10	17	73	*

Residents and community leaders ranked employment only significantly higher than small business development. Between group analysis also yielded no significant differences between options.

When asked "how Wolfgat could address these factors", qualitative data in Appendix 10 showed that both groups agreed that WNR could provide employment via the upgrading with facilities, removing invading alien plants and maintaining the area (Residents = 52%; community leaders = 35%). Educationally, practicing environmental education by using the area as an outdoor classroom to do curriculum-based work was also suggested by both groups as a way to help the community (Residents = 29%; community leaders = 32%).

Both groups also suggested that WNR can promote Health and Welfare by being an area where residents can mentally relax, do activities to promote physical fitness (Residents = 5%; community leaders = 7%) and harvest herbs for cheaper medicines (Residents = 5%; community leaders = 13%) (Appendix 10). A small percentage in both groups also suggested small business development by promoting eco-tourism (Residents = 1%; community leaders = 6%). When testing attitudes to harvesting in Section C of the questionnaire, although they did not differ significantly ($P=0.07$), residents felt slightly stronger (37%) than community leaders (27%) that harvesting of herbs is acceptable, if harvesting was regulated with a licence.

3.3.3. Factors influencing funding towards its conservation

Analyses was done on twelve and thirteen independent and socio-economic variables respectively, for residents and community leaders to determine which would contribute to a variation in willingness to allocate community and personal funds towards WNR conservation. A summary is provided in Table 5.2.9 for those six variables which showed a

significant variation in willingness. The community and personal funding questions were tested in another section of the questionnaire (Section C).

When respondents in both groups were presented with the attitudinal statement "*If the local authority is to receive money for community development, part of the money should be used to upgrade WNR*", 86% of residents and 86% of community leaders agreed with the statement ($\chi^2=0.00$, $df=1$, $p=1.00$). None of the selected factors in Table 5.2.9 influenced residents' opinions towards allocation of community development funds to WNR.

Table 5.2.9: Results of χ^2 tests for six socio-economic factors associated with allocation of community development funds and own personal funds towards Wolfgat conservation. This was done by grouping related statements on funding in Sections C and D of the questionnaire, to test attitudes to funding Wolfgat conservation. Mean allocation is that found in Table 5.2.7 (i.e. for residents = R113 000 and community leaders = R115 000). Significance values; NS= not significant, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Willingness to contribute financially to WNR conservation	Age Residents mean=38years Comm. Leaders mean=42years	Occupation -unemployed -semi-skilled -skilled	Educational Level -primary -secondary -tertiary	Awareness -yes -yes versus no	Watch TV - yes versus no	Income -R0-800 -R801-3000 -R3001-6000
*Willingness to allocate above the mean from community development funds - Residents - Community Leaders	NS 5.0 *	NS NS	NS NS	NS NS	NS 7.4 **	NS 9.1 *
* Willingness to pay an extra R1 on property rates monthly if it will assist with upgrading WNR - Residents - Community Leaders	NS NS	NS 14.4 ***	NS 6.9 *	4.2 * NS	4.0 * NS	NS NS

For community leaders, willingness to spend below and above the mean allocation of community development funds were positively, significantly related to age, whether the respondent watched television programmes which featured environmental issues or not, and income. Although the majority in those >42years and those <42 years were willing to allocate above the mean from community development funds, community leaders >42 years expressed more positive attitudes towards allocating above the mean than those < 42 years old. A higher proportion of community leaders who did watch television expressed more positive attitudes towards allocating above the mean from community development funds than those who did

not watch television. Community leaders in the three income categories >R801/month were more positive to allocating community development funds than community leaders in the <R800/month income category.

Willingness to allocate personal funds were determined by comparing the independent variables with responses to the statement “ *Residents in the community should pay an extra R1.00 on their rates monthly if it is to assist with the upgrade of WNR*”. Results revealed that a significantly higher percentage of residents (75%) than community leaders (48%) agreed with this statement ($\chi^2=15.39$, $df=1$, $p=0.0001$). For residents, only two factors, awareness and having watched television which featured conservation stories were positively, significantly related to whether a resident was willing to pay from personal funds or not, to assist with the upgrading of WNR. A significantly higher proportion who were aware expressed more positive attitudes to paying from own funds than those who were not aware. While the majority in both groups who watched television and who did not, were willing to pay from own funds, a significantly higher proportion who watched television featuring conservation stories expressed more positive attitudes to paying from own funds than those who did not watch television.

For community leaders, two factors, occupation and educational level were significantly related to whether a respondent was willing to pay from personal funds or not, to assist with the upgrading of WNR. Unemployed community leaders were significantly more negative to allocating from personal funds than those in the semi-skilled category. Those in the skilled category appeared divided as 49% of them were willing and 51% were unwilling to pay from personal funds. Community leaders with a tertiary level education were more positive towards paying from own funds than those with a secondary school level education. Primary school level community leaders appeared divided as 55% of them were positive and 45% were negative towards paying from own funds to assist with the upgrading of WNR.

3.4. Crucial conservation and management issues

3.4.1. Attitudes to WNR conservation

Attitudes to WNR conservation showed that while the majority in both groups supported retention of WNR as a reserve, a significantly higher percentage of residents than community leaders supported the retention of WNR as a reserve (Table 5.2.10). The overwhelming majority in both groups also felt that keeping it for their children was more important than developing facilities on the reserve.

To determine attitudes to ownership of WNR, respondents were asked *Who do you think owns Wolfgat Nature Reserve?* All community leaders took a stance on this issue while 17% of the residents indicated that they did not know. Both groups appeared divided on this issue. Just over half of the residents (54%) and community leaders (57%) felt that the local authority called the City Council owned the reserve. A higher, but non-significantly different ($P=0.21$) percentage of community leaders (40%) than residents (19%) felt that the community owned the reserve. Other answers included the government (Residents=8%, Community leaders=3%), the law (Residents=1%, Community leaders=0%) and the RDP (Residents=1%, Community leaders=0%).

Table 5.2.10. Statements used to determine attitudes toward conservation of WNR between Residents ($n=200$) and Community Leaders ($n=100$). Categories collapsed into A= agree, N = Neutral, and D = disagree. Values are expressed as a percentage and rounded up. Significance value calculated using the χ^2 test on Agree versus Neutral/ Disagree, at 5% level.

Statements	Residents			Community Leaders			P
	A	N	D	A	N	D	
It is worth keeping Wolfgat as a nature reserve	96	1	3	80	19	1	0.00
Wolfgat is a waste of land. Part of it should be used to build facilities for the community	28	1	71	19	2	79	0.09
It is more important to keep Wolfgat for our children than to develop facilities on the land	96	0	4	94	2	4	0.44

3.4.2. Perceptions of the management authority

To determine perceptions of the management authority, respondents were asked if they were aware of “*what management functions City Council officials a) do in Wolfgat; b) how well they do it and c) how important it was for them to do it.*” This pertained to aspects such as: (1) keeping the area clean; (2) protecting citizens from criminals; (3) protecting plants and animals; (4) preventing hunting; (5) attracting tourists; and (6) keeping people from using the area (see Appendix 11a,b,c for detailed results).

As to what the City Council officials do in WNR, the majority of the residents felt that they could not answer the question (an average of 80% respondents for the six issues) (Appendix 11a). Just over half of the community leaders also felt that they could not take a position on this issue (an average of 57% respondents for the six issues). To all aspects, of the 20%

residents who responded, a higher percentage (14% on average) had a negative perception of what officials did in WNR. Community leaders were divided as to whether officials kept the area clean, 41% agreed and 42% disagreed. In response to protecting plants and animals, 52% felt that they did while 38% felt that they did not. Just over half (54%) of community leaders did not think that officials kept people from using the area. Community leaders also felt that officials did not protect citizens from criminals (83%), nor did they prevent hunting (58%), or actively work to attract tourists (65%).

A significantly higher proportion of community leaders than residents felt that the managing authority did not protect citizens from criminals ($P=0.04$) and did not attract tourists to the area ($P<0.01$) (Appendix 11a). As to how well the City Council carried out their functions, residents felt more strongly (80% of respondents for the first five issues) than community leaders (46% of respondents for the first five issues) (residents = 80% of respondents) that they did it poorly (Appendix 11b). For the residents group, 6% of the residents felt that they did it fairly, while 10% felt that they did it very poorly. The remaining 4% felt that they did it well to very well. For the community leaders group, 8% felt that they did it fairly, while 34% felt that they did it very poorly. The remaining 12% felt that they did it well to very well.

The two groups differed significantly on officials' performance on four aspects. Residents felt that they did not keep the area clean while community leaders thought they did ($P<0.01$). The majority in both groups felt that officials protected plants and animals, but community leaders felt significantly stronger ($P<0.01$). The majority of residents felt that officials did a poor job of preventing hunting and did well in keeping them from using the area. In contrast, the majority of community leaders felt that officials did well at preventing hunting ($P<0.01$) but did not keep them from using the area ($P<0.01$).

As to how important it is that they carry out the first five aspects or functions, community leaders felt more strongly than residents that it was very important (Appendix 11c). An average of 83% community leaders and 61% residents felt that it was very important, and an average of 39% residents and 15% community leaders felt that it was important. Also, although the majority in both residents (98%) and community leader (62%) groups agreed that it is bad to keep people from using the area, residents felt significantly stronger about this issue than community leaders ($P<0.01$, $d.f.=4$).

3.4.3. *Community involvement in management?*

In order to adequately inform both groups about WNR as a prerequisite to becoming involved in WNR management, respondents were asked how they would like to be informed about WNR matters. The majority in both groups supported various awareness creation mechanisms such as community newspapers, signboards, radio, and pamphlets. However, the majority of residents (91%) were in favour of television while the majority (68%) of community leaders opposed it. (see Appendix 12a). A significantly higher ($P = 0.01$) percentage of community leaders (100%) than residents (73%) were willing to attend a meeting, which community leaders preferred in the form of a workshop. Community leaders belonging to the Health and Welfare sector were more positive towards being educated via workshops, than those belonging to the other sectors ($\chi^2=11.26$, $P=0.04$).

When respondents were asked “*what would make it worthwhile should they go to an education programme*” of the 10 types of responses identified, (see Appendix 12b) two areas of agreement were identified as follows: (1) about a third of the residents (31%) and about a half of the community leaders (45%) wanted the attributes of Wolfgat explained to them; (2) 23% residents and 13% community leaders wanted to know what facilities or developments are being planned there. Residents were more interested than community leaders in wanting to know more about the plants and animals (Residents = 14%; Community leaders = 5%). Community leaders were more interested than Residents in wanting to be empowered to conduct workshops about WNR elsewhere (Residents = 14%; Community leaders = 5%).

When asked if they “*would like to become involved in Wolfgat conservation?*”, almost twice the percentage of the community leaders (88%) than residents (45%) were willing. As residents are not always able to attend community meetings and are usually represented by community leaders, it was appropriate to find out who residents and community leaders regard as leaders in their community to represent them. Residents gave the most support to educational (35%), followed by Civic/ Ratepayer organizations (32%), religious (22.5%) and political leaders (7%) as their first to fourth choices. In contrast, community leaders gave the most support to political (51%), followed by civic/ratepayer (17%), educational (8%) and religious leaders (7%) as their first to fourth choices. Appendix 12b shows that a greater proportion of Community leaders than residents felt that the manner in which they could help with Wolfgat conservation (Residents = 31%, Community leaders = 65%) was to raise awareness in the community and in meetings they attend, and in an administrative manner (Residents = 5%, Community leaders = 16%). Residents felt much stronger than community

leaders that they could help voluntarily as patrols (residents = 28%, community leaders = 5%).

Three quarters of residents (75%) felt that in the future, all community consultation relating to WNR management should be directly with them while just over half of community leaders (57%) felt that this would be a feasible route. About one third of leaders (31%) and a quarter of residents (25%) felt that consultation should happen via community leaders while a small remainder in both groups felt it should happen via the government initiatives (such as the post-1994 Reconstruction and Development Programme (RDP)), a platform for community-based organizations and politicians.

4. Discussion

4.1. The role of the reserve

4.1.1. Current use and factors that affect its use

The findings that about two thirds of the residents and about two fifths of the community leaders would not use WNR in its present state, suggest that at present, the conservation of WNR is viewed poorly by residents, but more positively by community leaders. This is corroborated by the findings that a higher percentage (1 1/2 X) of community leaders than residents intend to use WNR once or twice a year. This also suggest that at present, residents feel that they do not derive benefits from WNR. Deriving benefits have been shown by other authors (Gillingham and Lee, 1999; Abbot et al., 2001; Mehta and Heinen, 2001) to be the key to perceiving conservation of PAs positively. These findings also suggest that residents feel stronger than community leaders that they do not find conditions in WNR conducive to their use. Conditions such as no facilities that prevents use, needs to be urgently addressed in the Environmental Management Plan of WNR (City of Cape Town, 2001), whose main aim is to get the adjacent community to sustainably use the area.

While both groups cited drawbacks such as Crime, lack of patrols and rubbish dumping as the main drawbacks that would keep them using the area, it augurs well for WNR conservation that almost all respondents felt that these could be solved by employing patrols to monitor crime and dumping. A job creation programme using local contractors, similar to that of the South African *Working for Water Programme* (van Wilgen et al., 1998) to remove the invading alien plants to upgrade WNR could also increase the feeling of benefit. The upgrading of the reserve has become important since local schools have started using the area for environmental education since 1989 (Manuel, 1995). This has again been formally initiated in 2005 under the Cape Flats Nature Programme (Soal and van Blerk, 2005). A structured environmental education programme, including for schools, could be a way to

change attitudes and see such a programme as a benefit. Thus, increasing the community's access to benefits from WNR and involving them in alien plant management may enhance their support and promote the sustainability of the WNR (Cartwright, 1991; Brown and Wyckoff-Baird, 1995).

Both residents who had visited before, those who had not and community leaders who had not visited felt that crime was a drawback to their current use. Community leaders who had previously visited did not feel that crime was a threat. The response of residents and community leaders who had not visited before was probably due to previous events of crime published in the local newspapers where a paedophilic serial murderer dumped his victims in Wolfgat (Swartz, 1994). It suggests that respondents in both groups who had not visited WNR before gained their perceptions from the media while it is known that community leaders who had visited WNR before were accompanied by police and law enforcement officers while residents were unaccompanied. While gender was not found to be associated with crime in this study, Warr (1985) has shown that women urban dwellers felt more at risk from crime in urban natural environments than did males, who evaluate risks as smaller and less serious than women (Stern et al., 1993).

While no independent variable was associated with rubbish dumping as a drawback for community leaders, female residents and residents who had previously visited felt that rubbish dumping acted as a drawback in them using WNR. Pollution is a sign of urban decay and this has been shown to increase the chances of vandalism and crime in an area (Kuo et al., 1998). That residents who had previously visited felt that rubbish dumping acted as a drawback more than those who had not, suggests that rubbish dumping had a significant impact on residents who had previously visited, as they probably witnessed the pollution which have been poorly managed by the local authority prior to this survey (Khan, 1994). The findings that the majority in both groups agreed that *"people dumping rubbish in Wolfgat should be punished by paying a fine"* are consistent with that found by Preston (1995). He found that 77-81% of visitors to four South African nature reserves supported the "user-pays" principle that social costs incurred should be paid for by the perpetrator.

Residents who watched television programmes which featured conservation issues did not feel that the lack of patrols would act as a drawback to using WNR probably because they perceived the area as a traditionally, structured nature area, with natural attributes such as its scenic beauty. Currently, the patrol regime in WNR is on an ad hoc basis. The reserve's low annual operating budget of R100 000 (City of Cape Town, 2001), suggest that an effective reserve-specific patrolling programme will remain a problem and that patrolling of the area

should be integrated into local community police functions. Similar resourcing challenges in developing and policing PAs have been found in other parts of Africa (Hannah, 1992) and Madagascar (Nicoll and Langrand, 1989; in Holmes, 2003).

While primary school educated community leaders were divided, tertiary level leaders were more concerned about the lack of information acting as a drawback than secondary level leaders. This was probably because 23 of the 24 leaders with a tertiary education indicated that they would use WNR at least once a year in its present state, provided they had more information. This need for information suggest a higher level of acceptance of the WNR by tertiary educated community leaders. It is consistent with findings at Machilla National Park in Ecuador (Fiallo and Jacobson, 1995), where the level of acceptance of the Park increased with an increased level of education, and at Kosi Tappu Wildlife Reserve, in Nepal, where respondents with higher household literacy rates had more positive attitudes about the reserve (Heinen, 1993). The findings for residents with a tertiary level education in this study that the lack of information did not act as a drawback are thus contrary to those of community leaders and other studies such as those mentioned above.

Residents who earned >R6000/ month were more concerned about the lack of information acting as a drawback than those who earned <R6000/ month. The findings for residents with a higher level of income in this study that the lack of information did act as a drawback are consistent with those for community leaders in this study and consistent with those found by Fiallo and Jacobson (1995) and Heinen (1993).

4.1.2. Future use and factors that affect its use, if upgraded

If upgraded, 75% residents and 87% community leaders would use the area often (at least once per month). These findings suggest that more community leaders would visit more often than residents. Furthermore, the results suggest that the frequency would be as follows: On a weekly basis, about ten times more residents and about four and half times more community leaders can be expected, than at present. On a monthly basis, twenty times as many residents and thirteen times more community leaders can be expected. The above findings are crucial for WNR and suggest that the management plan should address future human impact if a balance between use and ecological integrity is to be maintained.

Although Environmental Education was ranked first as a non-utilitarian (non-consumptive) choice by both groups, a higher percentage of community leaders supported Environmental Education, probably because they were better informed than residents of education activities undertaken by local schools in WNR in 1995 (Manuel, 1995). Regular articles did appear in

the local community newspaper called *The Peninsula Times* (Burbidge, 1995; De Bruin, 1995; 1996; 1997). This suggests that sampled residents did not always read these articles and that community leaders had greater access to them. This supports the notion that the perception of benefits from fynbos depend directly on the knowledge of stakeholders (Jackelmann and Britton, 1995; Le Maitre et al., 1997).

Community leaders felt slightly stronger than residents about Nature protection as their second most important non-utilitarian (non-consumptive) choice. Respondents in both groups thus value the protection of nature more than residents adjacent to five protected areas in Tanzania where only 12% of respondents perceived the Selous Game Reserve as important for the protection of nature (Newmark et al., 1993). The support for Non-utilitarian values as found in this survey such as environmental education and nature protection are consistent with similar studies of high school students in Tanzania (Pennington, 1983) and Cape Town, South Africa (Le Maitre et al., 1997). In Tanzania, 37% gave priority to protected areas for their aesthetic and bequest value. In the Cape Town based study on students from differing socio-economic backgrounds, support for nature protection ranged from 22% for a poor Khayelitsha school, 35% for a Mitchell's Plain school, to 75% for an affluent Constantia suburb school (Le Maitre et al., 1997).

This study has shown that about 40% in both groups cited eco-tourism as their main consumptive use, and about 90% in both groups cited that tourism will benefit their communities. The perception that the area will be most valuable for nature-based tourism as the most important consumptive benefit is consistent with studies found for people living adjacent to two national parks in Rwanda (Weber, 1987), five protected areas in Tanzania (Newmark et al., 1993) and adjacent to the Greater Saint Lucia Wetland Park (GSWP), in South Africa (Picard, 2003). Even though both groups strongly supported eco-tourism, the finding by Turpie et al. (2003) that input costs could be as much as 30% of gross turnover as was found for the fynbos areas on the Agulhas Plain in South Africa is sobering. Furthermore, lessons from other African protected areas (Mason, 1995; Emerton, 1998; Infield and Adams, 1999), have shown that most protected areas do not realize sufficient revenue to offset the costs to communities retaining them. Brandon (1996) further cautions that tourism in developing countries and in developing contexts, such as with WNR, could be an unpredictable industry, and has in many instances, failed to bring significant economic impact to local communities (Boo, 1990). While eco-tourism is seen by residents and community leaders as a way of achieving job creation and economic development, this concept has had reasonable success in other PA contexts in South Africa such as the Richtersveld (Fig, 1994;

Fig and Archer, 1993), Kruger National Park (Wells, 1995) and the Greater St. Lucia Wetland Park (Picard, 2003).

A study carried out by Ashley and Garland (1994; *cited in* Wells, 1995) investigated four types of community-based tourism models. They found that joint-venture lodges appear to offer the best chance of strengthening the link between conservation and community-based tourism. This is promising as residents and community leaders wanted to specifically focus on lodge facilities as part of their eco-tourism ventures. Significant barriers to deriving benefit from eco-tourism in the Mitchells Plain community would be the lack of affordable financing, high unemployment and local capacity in the fields of business management and tourism, factors considered crucial by Wells (1996) to ensuring successful participation in the economic opportunities represented by eco-tourism.

The findings of Turpie et al. (2003) that nature-based tourism contributes about R7443 million per annum to the CFR should be analyzed further and a study undertaken to see if ecotourism in WNR can be sustainable and what lessons can be learnt from other community experiences. The potential of the Industrial Development Corporation's eco-tourism fund, a fund provided by the South African Government, to support these ventures should also be explored. The high support for an information centre with facilities and a curio shop by both groups could also act as a benefit to the community in providing employment. Together with ecotourism and employment, WNR could also be upgraded to increase community participation in another three economic areas related to ecotourism. These are selling goods and services directly to tourists, providing traditional culture experiences and providing an affordable nature experience to low-income local visitors (Wells, 1996), such as low income families suggested by twice as many residents (12%) than community leaders (6%). The potential value of ecotourism in WNR has yet to be determined and should form the basis for another study.

Both groups suggested using the area for other consumptive uses such as a playpark and camp site. This should be explored in a poor community context such as is found in WNR. Wells et al. (1992) however, cautions that activities such as a camp site, if unregulated, may prove problematic as it would link conservation with developments to create economic benefits that are incompatible with conservation. These developments in WNR might also contribute to the increase in littering with the present lack of patrols and would decrease the aesthetic beauty which is an important attribute of the area. It is clear that the management of different land-use options for WNR will have to remain an engaged, vigilant process as the lure of greater earnings in consumptively using the reserve may find favour with sectors in the community which are interested in short term gain and not the long term conservation of the area

(Hackel, 1999). This study, therefore, suggest that WNR should be upgraded and managed primarily for use in Environmental Education, nature protection, relaxation and secondary for nature-based tourism involving joint-venture lodges, as was found for a Community Baboon Sanctuary in Belize (Hartup, 1994).

Performance indicators for crime prevention, provision of patrols and ongoing information should be developed to ensure that it remains monitored. In addition, nature-based tourism should be developed, regulated and the management of the area should explore examples to reflect locally important cultural values, as proposed by Infied and Namara (2001) and shown in Namibia (Jones, 1999) and Tanzania (Kangwana and Ole Mako, 1998). In this way, reflecting local values will help build support for conservation that has real meaning to the local community.

The independent variables tested against perceived utilization practices in an upgraded WNR only significantly influenced non-consumptive uses such as environmental education, recreation and relaxation/scenery. Residents who had a higher educational level (secondary school and above), had higher income levels (>R3000/month) and who had studied Biology, were more positive to using an upgraded WNR for environmental education, is probably due to them having been exposed to conservation issues in ecology sections of secondary school science curricula and having a high enough incomes to satisfy their basic needs. Primary school curricula in Mitchells Plain did not contain conservation issues at the time of the survey. Our findings for residents that education and higher incomes improved conservation attitudes are in agreement with other studies (Mordi, 1987; Fiallo and Jacobson, 1995; Sah and Heinen, 2001). The findings for community leaders that education did not affect conservation attitudes are similar to that of Parry and Campbell (1992) and De Boer and Baquette (1998). The findings that poorer, lower income residents did not support WNR for environmental education can be explained by the fact that poorer residents focus more on meeting their immediate needs such as jobs, food and shelter (Breen et al. 1992). That residents who were aware and had visited WNR before were more negative to using the area for environmental education, is probably due to their belief that the local authority would continue to neglect the area in the future (Khan, 1994).

The position of the non-business sector component of the community leaders to support the area for environmental education is consistent with the general hypothesis that those who perceive benefit from protected areas, are likely to support its conservation (see Lewis et al., 1990). The business sector all supported consumptive eco-tourism but did not support and did not see themselves as benefiting from environmental education in WNR. Similarly, Sah

and Heinen (2001) found a negative correlation between resource use and conservation attitudes in Ghodaghodi Lake area, Nepal.

The finding that recently-settled residents were more positive to using WNR for recreation is probably due to their ignorance of the area's current condition with regard to the lack of facilities and perceived lack of restrictions. The majority of those who had already visited the area and were more familiar were those who had been settled in the area for longer. Longer-term residents were also more likely to have been adversely affected by restrictions imposed after WNR was established in 1986. This concurs with findings of Newmark et al. (1993) who found that longer-residing residents living adjacent to five PA's in Tanzania were less supportive of the retention of the adjoining PA for conservation than were short-term residents. Weladji et al (2003) also found that recently-settled persons were more positive to Benoue Wildlife Conservation area in Cameroon, when they were granted hunting concessions. Education and business sector community leaders were more positive to using WNR for recreation, probably because the education and business sectors were more familiar with the area and felt that WNR would relieve the stresses from issues in their sectors. Business sector community leaders were more positive to using WNR for relaxation/scenery, probably because of the general feeling suggested by many of them that "*it's an area where I could take my family and mentally relax*". The finding that community leaders with more than a primary education level were more negative to deriving benefit from WNR via relaxation/scenery than leaders with a primary level education is consistent with the findings of Weladji et al. (2003). However, it is contrary to other studies which found that education improved attitudes to conservation (Parry and Campbell, 1992; Fiallo and Jacobson, 1995; Sah and Heinen, 2001).

4.2. Prioritisation of, and the role of Wolfgat in relation to other socio-economic development themes

4.2.1. Allocation of funding and the ranking of community development options with Wolfgat as part of the options

The findings for funding allocation toward community development suggest that the future of WNR can be assured. Residents and community leaders included WNR conservation as part of the top five development options in an integrated community and development project (ICDP) budget scenario where R1 million was allocated for community development. Other studies have also shown that the future of PAs can only be assured if they play a role in supporting local social and economic development within an ICDP framework. (Hanekom and Liebenberg, 1994; Brandon, 1996; Wells, 1996; Mittermeier and Fonseca, 2003).

Any additional funds invested in ICDPs should be financed by additional public sector funds, rather than reduce budgets for conservation of PAs (Wells, 1996).

Comparable studies of how communities adjacent to PAs intend allocating government financial resources are elusive. However, Preston's (1989) determination of how the South African national government should apportion resources, showed that of the two groups sampled, the majority of business leaders' and professional ecologists' rated Education, Job creation, Health and Welfare and Housing above environmental issues. Findings in this study that residents and community leaders in Mitchells Plain prioritized Job creation, Housing, Health and Welfare, Education and Conservation as the top five in a local community context, suggest that issues such as Education might be prioritized as more important at a national level (Preston, 1989) and Job creation more important at the community level. The higher allocation of resources by community leaders to Job creation and residents to social development, suggests that community leaders have a long term view of poverty alleviation, while the needs of residents' are more immediate and short term.

Presently, the local authority does not have a policy on what proportion of community development money should be allocated to environmental conservation issues in an ICDP context (Stephen Granger, Head: of Environmental Management, City of Cape Town, pers. comm., December 2004). This study has found that both Community leaders and Residents allocated 11% of community development funds to conservation, of an area such as WNR. As eliciting effective participation is extremely difficult for ICDP's in local contexts, this proposed amount could act as a baseline for policy and decision-makers at local authority level. Local authority expenditure on community development in the current urban renewal programme amounts to R350 million (City of Cape Town, 2002). Should a mean of 11.4% be allocated to Wolfgat, it would translate to R39.9 million which is well above the R1020 per km² (equivalent to 157 US dollars, based on R6.50/ dollar at 2005 rates) for development and maintenance reported on as the international standard by Vierros and Barber (2003) for protected areas in developing countries. For its 248 ha Wolfgat will require R2.53 million per annum by international standards.

4.2.2. Community priorities with which Wolfgat could help

The finding that both groups felt that WNR could help with employment, environmental education, an area for mental relaxation and the harvesting of herbs suggest that there is a clear need to recognize that WNR conservation is about managing change in dynamic systems (Adams, 1996). There has to be adequate community education and information regarding the limited role the area can play in addressing community priorities. More emphasis should thus

be placed on the role of the area in environmental education and the rediscovery of cultural values (Infield, 2001). In this way, each person going to Wolfgat would perceive nature through different values and different forms of interpretation (Ingold, 1992).

4.2.3. Factors influencing funding towards conservation of WNR

Community leaders who were older, had incomes higher than the lowest category of R800/month and who watched television programmes which featured conservation issues were more positive about spending part of community development funds on upgrading WNR. This suggest that older, more environmentally aware community leaders perceived WNR's role in community development more positively than younger, less aware community leaders. This suggest that WNR management should take the lead in a programme focused on community leaders to explore WNR's role in community development. This would improve their knowledge of WNR and would improve the chances that WNR get funded from future community development funds.

The finding that markedly more residents (75%) than community leaders (48%) were willing to allocate personal funds to assist in upgrading WNR, suggest a greater sense of ownership to contribute to their own nature area. Residents who were more aware of WNR and who watched television programmes which featured conservation issues were more willing to contribute from personal funds towards WNR conservation than residents who were less aware and who did not watch television programmes which featured conservation issues. This suggest that residents who were aware of WNR would fund the area as they perceived that the area will benefit them. It also again confirms the findings of authors working in fynbos conservation (Jackelmann and Britton, 1995; Le Maitre et al., 1997) that the perception of benefits from fynbos depend directly on the knowledge of stakeholders. Unemployed community leaders were more negative to spending their own funds on WNR, probably because they needed to sustain themselves from their meagre incomes. It also confirms qualitative interview data with these community leaders that they felt that the management authority had neglected to adequately fund WNR for a long time. This they felt made them unwilling to spend their own funds towards WNR conservation. That the most educated community leaders were willing to spend from their own personal funds to upgrade WNR, is probably because they were also those who had the higher incomes.

4.3. Crucial conservation and management issues.

4.3.1. *Attitudes to support its conservation*

Although a higher proportion of residents (96%) than community leaders (80%) supported the retention of Wolfgat as a nature reserve, it is consistent with findings for previous urban attitude surveys carried out toward lowland fynbos protected areas such as Driftsands (Nguta, 1992) and Wolfgat (Khan, 1994). These authors found that 82 % and 94% respectively of respondents supported the retention of these areas as nature reserves. The overwhelming majority support by both groups is consistent with studies of other African countries. Of 206 people surveyed living adjacent to the Kilimanjao National Park in Tanzania, 84% supported retention (Newmark and Leonard, 1991), 71% support was found for people living adjacent to five protected areas in Tanzania (Newmark et al., 1992), and 82% of 600 school children in Tanzania disagreed that national park land should be used for agriculture (Pennington, 1983). The findings in this study is contrary to that of Infield (1988), who found that only 6% of 182 poor respondents living adjacent to the GSWP, in KwaZulu-Natal, South Africa, felt that it was unimportant to retain the adjacent area. When Picard (2003) later conducted a follow-up study on poor residents living adjacent to GSWP, she found that support for retention of the GSWP was 17%, which she considered fragile. Continued awareness creation via relevant media and improved involvement by residents in upgrading and management of areas such as WNR may ensure continued support for the retention of these PA areas (Brown and Wyckoff-Baird, 1995).

The finding that almost all residents (96%) and community leaders (94%) are prepared “to keep Wolfgat for future generations”, indicate that they still value the non-utilitarian (bequest) value of the area. This is in contrast with predominantly utilitarian view of residents adjacent to five Tanzanian nature reserves (Newmark et al., 1993) and Zulu residents adjacent to the GSWP in Kwazulu-Natal, South Africa (Picard 2003), where only 9% and 17% respectively, wanted the area to be conserved for future generations.

4.3.2. *Perceptions of the management authority*

There were two main views as to who owns WNR, namely the local authority and the community. While just over half in both groups indicated the local authority, about double the percentage of community leaders than residents indicated the community. This suggest that there is uncertainty and division amongst the two groups not only about ownership, but also about accompanying responsibility for WNR. This underscores the importance of ongoing communication between the managing authority and community with regard to ownership,

rights and responsibilities, as was found by Bauer (2003) for Woza National Park, in Cameroon.

The lack of knowledge of 80.2% residents as to what the local authority did in WNR is consistent with previous attitudinal studies in Africa (Hackel, 1990; Newmark et al., 1993; Gillingham and Lee, 1999) and in South Africa (Infield, 1988; Picard, 2003) where the actions of the local authority is unknown, irrespective of whether the conservation of the PA is supported or not. Of the 19.8% residents who responded, 13.5% had negative perceptions of what officials did in WNR. The lack of support for, and negative perceptions towards WNR management found amongst residents is consistent with reported attitudes toward park authorities for five parks in Tanzania, where Newmark et al. (1993) found that 71% of adjacent residents did not support park authorities, and in Natal, South Africa where 68% of people living adjacent to the Umfolozi/Hluhluwe Corridor held negative or neutral feelings towards the South African National Parks (SANP). Findings in Tanzania and Natal, South Africa are slightly higher than those found for community leaders, where 61% on average held negative or neutral feelings as to what officials did in WNR. In assessing if WNR officials protected wildlife, the percentage of community leaders who indicated that WNR officials protected plants and animals (52%) and prevented hunting (42%), and thus protected wildlife, is similar to that found for the 50% of Dukuduku residents, but lower than that found for the 76% of Khula village residents living adjacent to the GSWP (Picard, 2003). The criticism that drew the most support from community leaders (83%) was that WNR officials did not protect citizens. This is probably due to the negative crime publicity in the media mentioned earlier and the high urban crime rate in the communities surrounding WNR.

Studies elsewhere such as in Rwanda (Weber, 1987), in Natal, South Africa (Infield, 1988) and Brazil (Harcourt et al., 1986) have all shown that the continued existence of the protected area has been subject to its use based on utilitarian values such as harvesting of resources from the area. Findings in this study show that about one third residents and one quarter community leaders agreed to the harvesting of wildflowers from WNR, even with a licence. This suggests that respondents in both groups were unaware of the policy that harvesting plants is illegal in WNR (City of Cape Town, 2001). It also suggests that education programmes and awareness creation by WNR officials were lacking. The finding in this study that the majority in both groups supported the policy not to harvest wildflowers are consistent with findings of Weladji et al. (2003) in Cameroon where most households supported the wildlife policy around hunting resource use. Studies elsewhere have found that increasing local people's access to resources may enhance their support and promote the sustainability of the PA (Cartwright, 1991; Ite, 1996). This suggest that in order to strengthen resource use

policies in WNR, the involvement of adjacent communities need to be promoted and that WNR officials need to be empowered to interact with local people through education programmes that will result in collectively agreed upon, legitimate and enforceable resource-use policies (Brecht et al., 2002; Wilshusen et al., 2002).

Findings show that over four-fifths in both groups felt that officials did not carry out their functions well. This is markedly higher than findings of Parry and Campbell (1992) who reported that 49% of people living adjacent to two protected areas in Botswana considered that protected area employees did not carry out their tasks well. Contradictory perceptions between the two groups regarding keeping the area clean and preventing hunting suggest that community leaders are more familiar with, and have more interaction with WNR officials than residents did. The findings for poor perceptions to the managing authority and how well they do their work in WNR suggests that a well structured education and communication programme could improve perceptions of the majority of residents and of many community leaders to protected area employees. Results from similar attitudinal studies in Tanzania (Gillingham and Lee, 1999) and in Madagascar (Durban and Ralambo, 1994) confirm that perceived familiarity, contact with PA managers, as well as services and benefits that adjacent residents receive from PA managers strongly influence local attitudes to PA managers. However, deriving benefits does not automatically imply improved support for PA managers. Parry and Campbell (1992) have shown no relationship between direct benefits and improvement of attitudes to wildlife and protected area employees.

4.3.3. Community involvement in Wolfgat management

Positive conservation attitudes have been found to be associated with increased education (Heinen, 1993; Fiallo and Jacobson, 1995) and knowledge (Nyhus et al., 2003) of conservation issues. It is thus important to determine the preferred information transfer mechanism of respondents. The findings in this study show that residents prefer television while community leaders prefer to be informed via workshops. Such an approach for residents would be consistent with the approach taken by the *People and Plants Programme* (Hamilton and Walters, 2002) in Africa. Videos are used to raise awareness about community conservation initiatives. While workshops are not bad *per se*, negativity of community leaders towards WNR officials was probably more due to unkept promises made to community leaders at workshops in the past. Workshops have been found to be a successful means to explore important cultural values (Infield, 2001) and help build support for conservation that have real meaning to the local community in Namibia (Jones, 1999), Tanzania (Kangwana and Ole Mako, 1998) and the South Pacific Islands (Carew-Reid, 1990).

Findings in this study also suggest that for it to be worthwhile for respondents to attend, workshop programmes on WNR the following elements should be in place: programmes should be well advertised; reflect potential benefits to participants, have an initial introductory session which ensures that all participants are informed of the area's attributes and the facilities planned there in order to be able to participate, and result in collectively, negotiated and enforceable agreements (Breachin et al., 2002).

The finding that almost twice the percentage of community leaders (88%) than residents (45%) were willing to become involved in WNR conservation suggest that community leaders would speak on behalf of residents at WNR meetings in the future. While direct consultation of residents would be rather expensive, the finding that residents prefer educational leaders to speak on their behalf regarding WNR matters suggest that educators should be encouraged to participate in Wolfgat management. In the community, residents have a strong respect for educators. With educators integrating WNR more into their curricula, more informed children could influence their communities when passing information to the wider community, as has been demonstrated locally (Britton and Jackelman, 1995; Manuel, 1995), and in Europe (Uzzell, 1994). The preference of residents to have community leaders speak on their behalf on PA conservation issues has also been found for communities adjacent to the Chitwan National Park in Nepal (Haynes, 1998). With just over half of the community leaders preferring political leaders and about one fifth preferring CBO's, to speak on their behalf, suggests that WNR should be a standing item on the local political and socio-economic forum agenda.

5. Concluding comments

This study provides evidence that at present, WNR would not be used by the majority of residents. While over half of the community leaders would use WNR, it appears that presently, it does not benefit or have an important role to play in the community. The finding that both groups believed that the reasons for staying away, primarily because of crime, can be solved, augurs well for the ongoing use and potential benefit to the community. The testing of socio-economic factors suggests that arranging ongoing visits to WNR might mitigate the perception that crime is a threat to the use of WNR. Should WNR be upgraded, this study suggests that there would be a marked increase in the number and frequency of use by both residents and community leaders. The findings that both groups felt that the area should primarily be used for non-consumptive purposes such as for EE and Nature Protection, and for a certain type of eco-tourism as the main consumptive use, suggests that WNR should be used as a multi-purpose PA which provides benefits that are compatible with its primary conservation objective. This is to maintain the ecological integrity of the area. Findings also

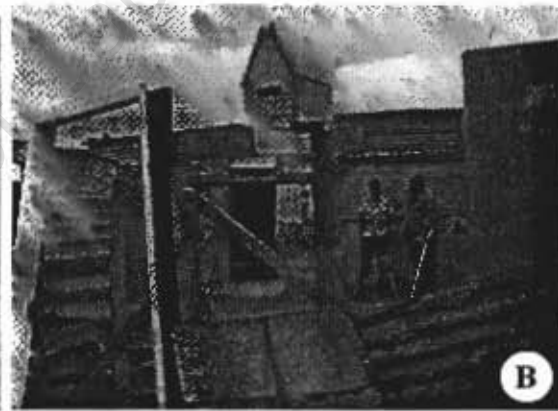
indicate that facilities to be developed as part of upgrading is seen by both groups as primarily benefiting the wider community through providing recreation, jobs, family outings and also, although not exclusively, for use by schools for environmental education. Even in an upgraded state, findings suggests that both groups want crime, provision of regular patrols and ongoing information to be monitored, to ensure their ongoing usage. Findings indicate that increasing the level of knowledge of WNR through formal and informal education programmes in the community and through increased visitation to WNR would ensure ongoing appreciation of using the area for EE, recreation and relaxation/ scenery.

The finding that both groups prioritized WNR as one of the five key community development themes suggests that integrating WNR into future community development planning would be crucial for its future conservation and use. Results also suggest that a baseline percentage from community development funds for environmental improvement should be explored. Responses from both groups also indicates that WNR should be viewed as a resource to assist other community development themes such Job Creation, Health and Welfare (particularly mental health) and Education. Programmes to increase awareness, build local knowledge of WNR and highlight its bequest and cultural value, would go far in improving support from both groups for funding its conservation, and should be explored.

As for community involvement in management, the results suggest that reserve management should be based on a co-management model grounded in community participation where: 1) roles and responsibilities are clear; 2) capacity building of both reserve staff and community representatives takes place; 3) policies and regulations for resource use and nature reserve management are in place; 4) a neighbour-relations programme is instituted where the functions of reserve staff are broadened to beyond mere patrols to more extension work; 5) capacity building of management committee members, particularly community leaders, to implement and manage innovative conservation finance initiatives takes place as it will be crucial to the development and functioning of the reserve. Thus, creating an ongoing dialogue between PA employees and the local community will be critical in ongoing management and conflict resolution (Hough, 1988). This had been recommended in developing countries (Crowfoot and Wondolleck, 1996) such as Kenya (UNEP, 1988) and China (Quingkui, 2003), as a means of increasing public participation in the management of protected areas and improving relationships between local people and PAs. While the above findings would assist WNR and other lowland fynbos PA managers to set management priorities for the future conservation of WNR and other lowland fynbos areas, priorities cannot be set without consultation of the of the communities most affected and which lies immediately adjacent to WNR. This then also forms the focus for the next study in this project.

CHAPTER 5.3

ATTITUDES OF ADJACENT, CULTURALLY DIFFERENT COMMUNITIES TO THE CURRENT AND FUTURE ROLE OF WOLFGAT NATURE RESERVE



CHAPTER 5.3

ATTITUDES OF ADJACENT, CULTURALLY DIFFERENT COMMUNITIES TO THE CURRENT AND FUTURE ROLE OF WOLFGAT NATURE RESERVE

1. Introduction

This study investigates the attitudes of the coloured community of Tafelsig in Mitchells Plain and the black community of Harare in Khayelitsha to the current and future role of WNR. Each community has different origins, cultural values, socio-economic conditions and suffered under apartheid, which resulted in exclusion of (black) residents from using or otherwise benefiting from PAs (Wells, 1996), such as WNR. In most cases, as with WNR, this resulted in non-awareness, misunderstanding, conflict and mistrust (Ellis, 1994). In 1994, a limited survey (Khan, 1994) in Mitchells Plain commissioned by the City Council found that sampled Tafelsig residents supported the retention of WNR as a nature reserve. However, to date the Tafelsig or Harare community had not participated in any management planning of the area. In practice, however, WNR managers consider these immediately adjacent communities to be future stewards of WNR.

Despite much research on the biological aspects of the conservation of plant habitat remnants such as WNR on the Cape Flats (Maze and Rebelo, 1999), there still remains a gap in our knowledge about how adjacent communities would like to use these areas, if they consider an area such as WNR a part of local community development, and what the perceptions these communities have towards conservation and management of an area such as WNR. Such knowledge would assist lowland fynbos managers to integrate the social aspects of adjacent communities into the conservation and biodiversity management of these PAs.

This study thus investigated attitudes of the above two groups by addressing the following questions: (1) What is the current role (levels and type of use) of WNR in its present state? What are the reasons why Tafelsig and Harare residents are staying away? What would its future role (levels and type of use) be in an upgraded state? (2) How do residents in each community prioritize WNR, and define its role, in relation to other socio-economic development themes within these communities, and how can WNR help with these themes?

(3) What are the attitudes of each group to WNR conservation, perceptions of the management authority and community involvement in management of the area?

2. Methods

2.1. Study context and data analysis

The general approach and specific methods for this study on the two adjacent communities of Tafelsig and Harare are described in detail in Chapter 4, sections 4.2.1 and 4.2.2. Briefly, this study involved a comparative questionnaire survey (see section 4.2.4) of the attitudes of 31 Tafelsig residents and 30 Harare residents. Tafelsig lies immediately to the north while Harare lies 1 km NE of WNR. They are both within 0-2 km of WNR. Data for this study was obtained by analyzing sections a,b,c,d,e,f of the questionnaire (see Appendix 4). Statistical methods and data analyses used are described in Chapter 4, section 4.2.5.

3. Results

3.1. Socio-economic features of the two adjacent communities

Socio-economic features of the two communities are described fully in Chapter 2, section 2.3. Key social features of the two communities adjacent to WNR are provided in Table 5.3.1. below. In both groups, similarities were reflected in the following: (1) 80% and more had moved into their community from another Cape Flats township and had moved there to own their own home; (2) about 40% in both groups had studied Biology at school. The main differences between the two communities were associated with language, residency length, education level, income, affluence, having watched conservation programmes on TV, awareness of WNR, having had previously visited WNR and culture/ traditions. About three quarters of Tafelsig residents preferred Afrikaans and >90% of Harare residents preferred a combination of Xhosa and English. Tafelsig residents have resided near the WNR significantly longer than Harare residents ($t=4.18$, $p < 0.001$). While residents in both groups only achieved a primary and secondary school educational level, 42% in Tafelsig compared to 63% in Harare, achieved a secondary educational level. The majority of Tafelsig residents (77%) had an income level in the R801-R3000 category while the majority of Harare residents (70%) had an income level in the <R800 category. Tafelsig residents were more affluent than the Harare residents in that the majority (71%) were in the comfortable category while the majority (60%) of Harare residents were poor. The majority of Tafelsig residents (90%) compared with about one third (37%) of Harare residents watched conservation programmes on TV. About 60% of Tafelsig residents were aware of WNR, only 10% of Harare residents were aware of WNR as a nature reserve. While the majority in both groups had not previously visited WNR, a higher percentage of Tafelsig (22%) than Harare (3%) had

visited WNR before. No Tafelsig residents practiced the custom of initiation while all Harare residents did.

Table 5.3.1. Summary of key socio-economic features obtained from this study of Tafelsig and Harare sample communities which lies adjacent to the Wolfgat Nature Reserve. Data for "total population" obtained from Census 1996. Percentages for both groups are shown.

Variable	Tafelsig (n=31)	No.	%	Harare (n=30)	No.	%
Total population	44 250 (2 214 persons per km ²)			19 798 (6 242 persons per km ²)		
Origin of adjacent community	Other Cape Flats coloured townships;	28	90	Other Cape Flats black townships;	24	80
	central Cape Town near Table Mountain	3	10	influx from the EasternCape province	6	20
Reason for moving here	Moved to own home and a better life;	26	84	Moved to own home and a better life;	24	80
	To be with parents	5	16	To look for work	6	20
Predominant language	Afrikaans	23	74	Xhosa and English	28	93
	English	8	26	Xhosa	2	7
Mean age	33.2 years (\pm 10.08) (range 18-59)			35.7 years (\pm 11.9) (range 18-76)		
Gender	Male	10	32	Male	13	43
	Female	21	68	Female	17	57
Occupation	Skilled	4	13	Skilled	4	13
	Semi-skilled	10	32	Semi-skilled	12	40
	Unemployed	17	55	Unemployed	14	47
Mean Residence time	9.5 years (\pm 5.2) (range 1-18)			5.1 years (\pm 2.5) (range 1-10)		
Highest Education Level	Primary school	18	58	Primary school	11	37
	Secondary school	13	42	Secondary school	19	63
Level of income	>R800 per month	7	23	>R800 per month	21	70
	R801-R3000 per month	24	77	R801-R3000 per month	9	30
Affluence ¹	Rich	0	0	Rich	0	0
	Comfortable	22	71	Comfortable	12	40
	Poor	9	29	Poor	18	60
Studied Biology at school	YES	13	42	YES	12	40
	NO	18	58	NO	18	60
Watch conservation programmes on television	YES	28	90	YES	11	37
	NO	3	10	NO	19	63
Awareness of WNR	YES	18	58	YES	3	10
	NO	13	42	NO	27	90
Previously visited WNR	YES	7	22	YES	1	3
	NO	24	78	NO	29	97
Mean Household size	5.4 persons (\pm 3.5) (range 2-22)			4.2. persons (\pm 1.7) (range 1-8)		
Culture/traditions	Do not practice initiation	31	100	Do practice initiation	30	100

¹Affluence is determined as follows: Rich = households who owned a recent model car, had 3 bedrooms, television, washing machine, fridge, stove, Hi-fidelity equipment; Comfortable = households with a car, had 2 bedrooms, television, radio, fridge; Poor = households with 1 bedroom, 2 plate stove or primus stove, fridge, radio.

Note: The term "coloured" refers to a grouping of people predominantly from Khoi-San, Malaysian, Indian and European origin. "Black" refers to indigenous people who migrated to Cape Town usually from other parts of South Africa.

3.2. The current and future role of the reserve

3.2.1 Current role if not upgraded

3.2.1.1. Frequency of present use

In its present state (Fig. 5.3.1.), 48% of Tafelsig and 100% of Harare residents indicated that they would never use the reserve. When asked why they would use it or not, Harare residents did not provide reasons for their position. Of the 16 Tafelsig residents (52%) who would use the reserve over various frequencies, six (38%) of these responses were positive. They indicated that they would enjoy nature (20%), relax (6%), using the reserve for walking (6%) and fishing (6%). Ten respondents had negative comments. These comments were that the reserve had no facilities (40%), was unattractive and neglected (6%), little information was available (6%), had no directions (6%), and was not upgraded (6%).

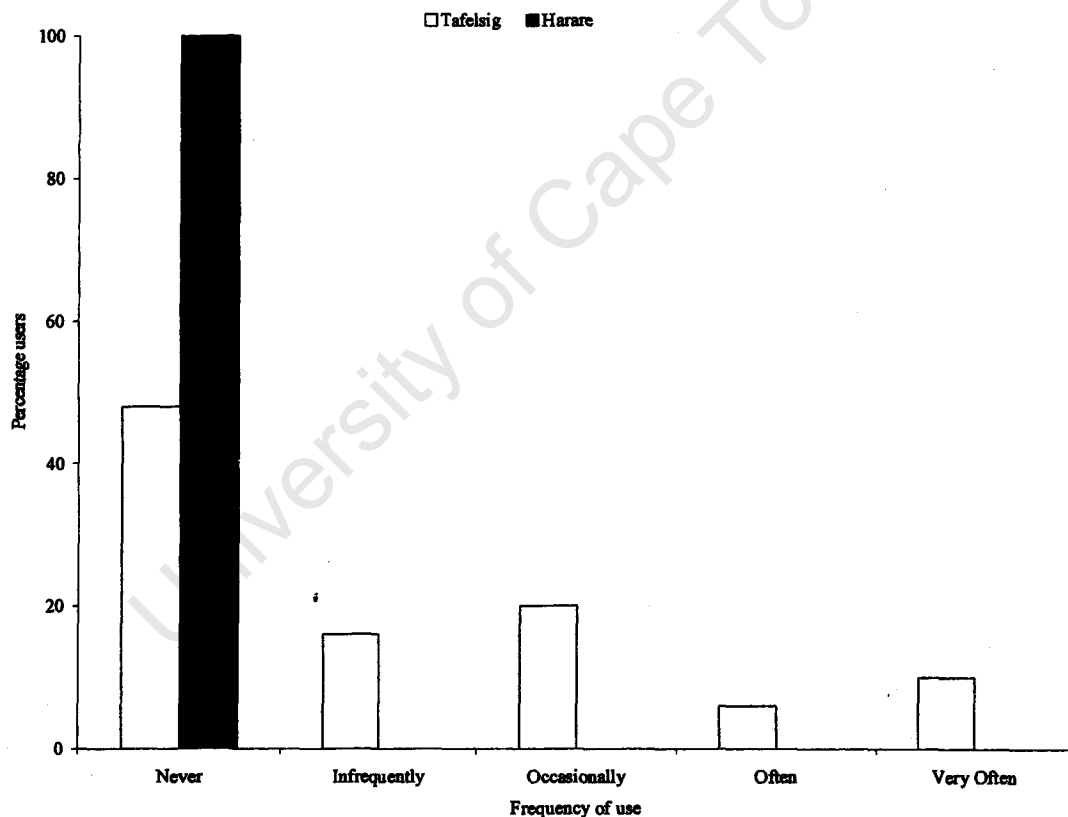


Figure 5.3.1. Perceived frequency of use of Tafelsig ($n=31$) and Harare ($n=30$) residents for the Wolfgat Nature Reserve in its current non-upgraded state. Significance level between Tafelsig and Harare residents calculated using sign test for between groups. $P=0.01$ (d.f.=4). Frequency categories are: Infrequently = once/twice per year; Occasionally = once every three months; Often = one to three times per month; Very often = once per week.

3.2.1.2. Reasons for staying away

About half of Tafelsig (48%) and Harare (50%) residents felt that the primary drawback to using WNR in its present state was the threat of crime and gangsterism. (Table 5.3.2.). In both groups, crime was not ranked significantly higher than rubbish dumping. Both Tafelsig and

Harare residents felt that dangerous gangs/crime was significantly more important in keeping them from visiting WNR than the lack of patrols, the thick bush of the area, the lack of information or their perception that WNR belonged to the City Council. Both groups felt that rubbish dumping was the second greatest drawback to them using WNR. Tafelsig residents cited the lack of patrols and the thick bush created by invasive alien plants as the third and fourth drawbacks respectively. Harare residents cited the bush and lack of information as the third and fourth drawbacks.

Table 5.3.2. The rank order of importance of six factors that currently prevent Tafelsig ($n=31$) and Harare ($n=30$) residents from using the Wolfgat Nature Reserve. Values are expressed as a percentage and rounded up. Significant differences between factors within Tafelsig and Harare residents calculated using the Wilcoxon-matched pairs test and in each case are compared with the most important factor preventing use i.e. "Dangerous gangs/crime". NS= not significant, * $p<0.05$, ** $p<0.01$.

Factor preventing use	Tafelsig							Harare						
	1st	2nd	3rd	4th	5th	6th	P	1st	2nd	3rd	4th	5th	6th	P
Dangerous gangs/crime	48	26	16	6	0	3	---	50	30	7	7	7	0	---
Rubbish dumping	19	29	10	13	19	10	NS	13	37	13	20	7	10	NS
Lack of patrols	0	19	26	19	23	13	*	7	27	17	20	13	17	*
Reserve is bush	16	13	13	32	19	6	*	20	10	40	17	7	7	*
Lack of information	16	6	16	16	32	13	*	10	10	10	23	33	13	*
Belongs to City Council, not us	3	6	16	10	6	58	**	0	3	10	10	23	53	**

When asked if these drawbacks could be solved, the overwhelming majority of Tafelsig (90%), and all of Harare (100%) residents felt that it could be solved. The recommendation which drew the greatest support from both groups was that patrols be appointed to work with the local police to combat crime and dumping in WNR (Appendix 13a). Thirty seven percent of respondents in both groups gave first priority to such an action. When posed with the question "It is likely that more people will visit Wolfgat if safety patrols are provided", the overwhelming majority of Tafelsig (97%) and Harare (97%) residents agreed with this statement ($p>0.05$). The recommendation that was given the second highest priority from Tafelsig and Harare residents was to remove the invasive alien plants (bushes) via job creation. Harare residents felt stronger about removing the bushes via job creation (25% of respondents) than did than Tafelsig residents (13% of respondents). Tafelsig residents' third most supported recommendation was to start a communication campaign in the local

community (13% of respondents) while Harare residents opted to impose fines on polluters (14% of respondents). When posed with the question that “*people dumping rubbish in WNR should be punished by paying a fine*”, the overwhelming majority of Tafelsig (87%) and Harare (100%) residents agreed with this statement ($p>0.05$).

3.2.1.3. Factors influencing perceived threats to the utilization of WNR in its current state

When testing factors which prevented utilization as dependent variables and socio-economic variables as independent variables, results showed that in both groups, having previously visited WNR was negatively ($p<0.05$) related to whether a respondent perceived crime as a threat to using WNR (Table 5.3.3). In both Tafelsig and Harare groups, significantly higher proportions of those who had not visited WNR before viewed crime as a threat. In Harare, a significantly higher proportion of those in the higher income and affluent categories viewed crime as a threat to them, utilizing WNR. (Table 5.3.3). In Tafelsig, a significantly higher proportion of those who had studied Biology at school viewed crime as a threat.

Table 5.3.3. Results of χ^2 tests for seven socio-economic factors associated with why Tafelsig residents ($n=31$) and Harare residents ($n=30$) are staying away from using WNR. Significance values; NS= not significant, * $p<0.05$, ** $p<0.01$.

Reason which prevents use	Age -Tafelsig mean=33 Harare mean=35	Occupation -unemployed -semi-skilled -skilled	Educational Level -primary versus secondary	Studied Biology at school -yes versus no	Income -R0-800 -R801-3000	Affluence - comfortable versus poor	Previously visited WNR -yes versus no
<i>Dangerous gangs/ crime</i>							
Tafelsig residents	NS	NS	NS	4.3 *	NS	NS	4.3 *
Harare residents	NS	NS	NS	NS	5.5 *	5.6 *	7.2 *
<i>Rubbish dumping</i>							
Tafelsig residents	NS	NS	NS	NS	NS	NS	NS
Harare residents	NS	NS	5.7 *	NS	NS	NS	NS
<i>Lack of patrols</i>							
Tafelsig residents	10.4 **	NS	NS	NS	5.1 *	NS	NS
Harare residents	3.9 *	8.50 *	NS	NS	NS	NS	NS
<i>Reserve is bush</i>							
Tafelsig residents	7.0 *	NS	4.8 *	NS	NS	NS	NS
Harare residents	NS	6.5 *	NS	4.5 *	NS	NS	NS
<i>Lack of information</i>							
Tafelsig residents	11.0 **	NS	NS	NS	NS	NS	NS
Harare residents	3.9 *	10.8 **	NS	NS	NS	NS	NS

A higher educational level significantly influenced perception of rubbish dumping in Harare but not in Tafelsig. While those who had completed primary school in Harare felt that rubbish dumping was not a threat, a significantly higher proportion of those who completed high school (63%) felt that rubbish dumping was a threat.

Age, occupation and income was positively related as to why respondents viewed the lack of patrols as the reason why they did not use WNR. In both groups, a higher proportion of residents younger than the mean age in both Tafelsig and Harare, felt that the lack of patrols was the reason why they did not use WNR. In Harare, a higher proportion of semi-skilled residents felt that the lack of patrols was the reason why they did not use WNR. Unskilled and unemployed residents did not feel that the lack of patrols kept them from using WNR. In Tafelsig, a higher proportion of residents in the higher income category felt that the lack of patrols was the reason why they did not use WNR.

In Tafelsig, age and educational level were positively related to why respondents viewed the thick bush of WNR as the reason why they did not use WNR. Significantly higher proportions of Tafelsig residents who were older than the mean age and those with a higher educational level felt that the thick bush was not a factor that kept them away. In Harare, occupation and having studied Biology at school were positively related to why respondents viewed the thick bush of WNR as the reason why they did not use WNR. Significantly higher proportions of Harare residents who were semi-skilled felt that the thick bush was a factor that kept them away. Unemployed Harare residents did not feel that the thick bush would keep them from using WNR. On the contrary, one resident remarked that it would be a place to collect firewood. This perception was confirmed when the majority of Tafelsig (71%) and Harare (87%) residents responded positively to the statement that *“even if Rooikranz (Acacia Cyclops) threatened natural plants, it should be left in certain areas if it provides firewood for people in our community. (p>0.05).* Significantly higher proportions of Harare residents who had studied Biology at school did not feel that the thick bush would keep them from using WNR.

In both Tafelsig and Harare resident groups, age was positively related as to why respondents viewed the lack of information as the reason why they did not use WNR. In both groups, a higher proportion of residents younger than the mean age in both Tafelsig and Harare, felt that the lack of information was the reason why they did not use WNR. In Harare, the majority of residents in each occupational category felt that the lack of information was a factor that kept them away.

3.2.2. Potential future role if upgraded

3.2.2.1. Frequency of future use

Should Wolfgat be developed (Fig. 5.3.2), seventy percent of residents in Tafelsig, and 40% in Harare indicated that they would visit at least once per week, while 16% of Tafelsig and 50% of Harare residents indicated that they would use the area one to three times per month. Over a period of a month, the majority of respondents in Tafelsig (86%) and Harare (90%) would use WNR.

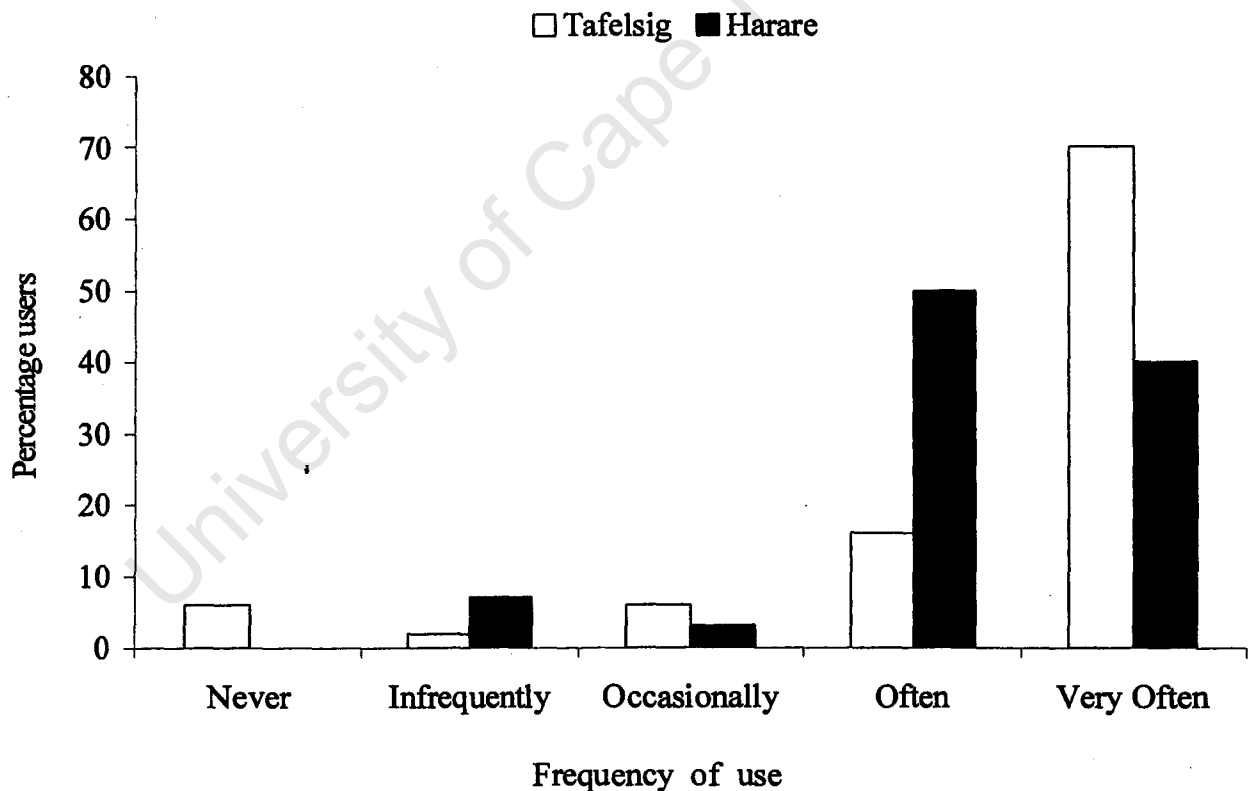


Figure 5.3.2: Perceived frequency of use of Tafelsig ($n=31$) and Harare ($n=30$) residents for the Wolfgat Nature Reserve should it be upgraded. Significance level between Tafelsig and Harare residents calculated using sign test for between groups: $P=0.03$ (d.f.=4). Frequency categories are: Infrequently = once/twice per year; Occasionally = once every three months; Often = one to three times per month; Very often = once per week.

3.2.2.2. Perceived utilization if upgraded

When asked to rank the non-consumptive uses of the area, 55% Tafelsig and 43% Harare residents ranked Environmental education and Nature protection as their first choice,

respectively (Table 5.3.4). Tafelsig residents also appeared to be more serious about Environmental education than Nature protection, while the opposite seemed true for Harare residents. Within-group preferences revealed that Tafelsig residents' chief priority, Environmental education, was slightly, but not significantly ahead of Nature protection which was ranked second, but significantly ahead of the other non-consumptive uses ($P < 0.05$). Harare residents' first choice, Nature protection was not significantly ahead ($P < 0.05$) of their second choice environmental education, but significantly ahead of their other non-consumptive uses ($P < 0.05$)

Table 5.3.4. The rank order of importance of five non-consumptive uses if Wolfgat were upgraded should Tafelsig ($n=31$) and Harare ($n=30$) residents plan developments. Values are expressed as a percentage and rounded up. Significant differences between factors within Tafelsig and Harare residents are calculated using the Wilcoxon-matched pairs test and in each case are compared with the most important non-consumptive use i.e. "Environmental education". NS= not significant, $*p < 0.05$.

Non-consumptive use	Tafelsig						Harare					
	1st	2nd	3rd	4th	5th	<i>P</i>	1st	2nd	3rd	4th	5th	<i>P</i>
Environmental education	55	45	35	32	13	---	37	47	20	33	27	---
Nature protection	26	32	10	6	13	NS	43	30	10	20	3	NS
Relaxation/scenery	10	10	29	29	6	*	7	7	27	10	27	*
Bird watching	0	6	3	19	48	*	7	13	13	13	23	*
Recreation	10	6	23	13	19	*	7	3	30	23	20	*

When asked to rank the consumptive uses, 45% Tafelsig and 47% Harare residents both ranked Eco-tourism as their first choice. (Table 5.3.5). Eco-tourism as a consumptive use was described as activities that included a lodge facility and horse-back riding to generate income, in the reserve. Tafelsig residents went on to rank a playpark and a camp site as their second and third choices, respectively. Harare residents ranked an initiation area followed by a curio-shop as their second and third choices, respectively. Tafelsig residents did not rank eco-tourism as significantly more important than a camp-site and a play park, but significantly ahead of the other seven consumptive uses. Harare residents did not rank eco-tourism as significantly more important than an initiation area, but significantly ahead of the other consumptive uses. Testing for internal consistency again proved that both groups preferred eco-tourism when both groups agreed that "it is likely that tourists who visit Wolfgat will benefit our community" (Tafelsig=87% and Harare 100%, $p = 0.15$).

Table 5.3.5: The rank order of importance of ten consumptive uses if Wolfgat were upgraded should Tafelsig ($n=31$) and Harare ($n=30$) residents plan developments. Values are expressed as a percentage and rounded up. Significant differences within each group calculated using the Wilcoxon-matched pairs test. Within each group, comparisons between consumptive use factors were carried out relative to "Eco-tourism". NS= not significant, * $p<0.05$, ** $p<0.01$.

Consumptive use	Tafelsig				Harare			
	1st	2nd	3rd	P	1st	2nd	3rd	P
Eco-tourism	45	23	3	---	47	33	10	---
Camp site	6	32	6	NS	17	17	3	*
Play park	26	23	16	NS	3	3	3	*
Curio shop	0	6	6	*	10	10	17	*
Community hall	0	0	0	**	0	7	43	*
Initiation site	0	0	13	*	20	23	13	NS
Soccer field	0	0	19	*	0	3	3	*
Caravan Park	10	13	10	*	0	0	3	*
Housing	10	0	0	*	3	0	3	*
Golf course	3	3	26	*	0	3	0	*

3.2.2.3. *Facilities to be developed and how they would benefit the community?*

When asked what facilities should be developed to encourage usage, if kept as a nature reserve, just over half of Tafelsig (58%) and two thirds of Harare (67%) residents suggested an information centre with toilet facilities, curio shop and a museum (Appendix 13a). Tafelsig residents further suggested that it will benefit the community if hiking trails (23%), a recreation area (13%) and a fishing area (6%) were developed. Harare residents further suggested that WNR will benefit their community as a recreation area (26%) and an area where a plant nursery (7%) could be developed (Appendix 13a).

Just over half of Tafelsig residents (52%) felt that the facilities would benefit their community via environmental education for local schools and about one quarter (23%) felt that it is a place to get close to and appreciate nature, a place for spiritual meditation and experience the quiet when hiking. Thirteen percent indicated that the area will be of a benefit as it can act as a heritage for future generations. Just over half of Harare residents (53%), felt that WNR could benefit their community via community outreach projects which would create employment when upgrading the area and when tourist visit the area, as an area for recreation to enjoy the attributes such as the plants, animals and scenery of the area (27% of respondents), as an area that can act as a heritage for future generations (16% of respondents), and for EE (4% of respondents).

3.2.2.4. Factors influencing perceived utilization practices in WNR if upgraded

When testing factors such as utilization practices as the dependent variable and socio-economic variables as independent variables, results showed that no factors significantly contributed to variation in using the area for environmental education (Table 5.3.6).

Table 5.3.6. Results of χ^2 tests for five socio-economic factors associated with perceived utilization of WNR if upgraded, by Tafelsig ($n = 31$) and Harare ($n = 30$) residents. Significance values; NS= not significant, * $p < 0.05$, ** $p < 0.01$.

Utilization practice	Age -Tafelsig mean=33 years Harare mean=35 years	Occupation -unemployed -semi-skilled -skilled	Residence Time (years) -Tafelsig mean = 9 years -Harare mean = 6 years	Watch TV programmes featuring conservation issues -yes versus no	Affluence -comfortable versus poor
<i>Environmental Education</i>					
Tafelsig residents	NS	NS	NS	NS	NS
Harare residents	NS	NS	NS	NS	NS
<i>Recreation</i>					
Tafelsig residents	NS	14.9 **	NS	NS	NS
Harare residents	NS	20.9 **	NS	3.7 *	5.0 *
<i>Relaxation/Watching the scenery</i>					
Tafelsig residents	NS	13.0 **	4.8 *	NS	NS
Harare residents	10.7 **	13.7 **	NS	4.3 *	NS

Occupation, “watching TV programmes which features environmental issues” and affluence negatively contributed to variation in using the area for recreation. For both Tafelsig and Harare resident groups, a higher proportion in each occupational category felt occupation would not be a factor that would influence them using the area for recreation, once upgraded. In Harare, the majority of those who did watch TV (82%) and all of those who did not, did not feel that TV would be a factor that would influence them using the area for recreation. In Harare, the majority of residents who were poor (72%) felt that they would not visit the area for recreation, once the area is upgraded.

Age, occupation, residence time and “watching TV programmes which features environmental issues” significantly contributed to variation in using the area for relaxation/scenery. In Tafelsig, age did not significantly influence residents’ perceptions of using the area for relaxation/scenery. In Harare, a higher proportion (81%) of younger residents <35 years old wanted to use the area for relaxation/scenery, while the majority

(78%) of the older residents (>35 years old) felt that they would not use the area for relaxation/scenery. In both Tafelsig and Harare resident groups, a higher proportion in each occupational category felt occupation would not be a factor that would influence them using the area for relaxation/scenery, once upgraded. In Tafelsig, the majority of residents staying there >9 years (90%) felt that they would use WNR for relaxation/scenery, while the majority of those staying there <9 years felt (78%) that they would not use WNR for relaxation/scenery. In Harare, the majority (68%) who did not watch TV, felt that TV would not be a factor that would influence them of using the area for relaxation/scenery.

3.3. Prioritisation and the role of Wolfgat in relation to local community development themes and factors influencing funding towards its conservation

3.3.1. Prioritization of WNR

3.3.1.1. When allocating R1million towards community development themes

A scenario where the earlier Reconstruction and Development Programme (RDP) of the government granted R1 million for development in the Mitchells Plain/Khayelitsha area was presented to respondents in each group. Each respondent had to make a choice as to how they would guide allocation of such funds. Table 5.3.7 shows how each group wanted this money allocated.

Tafelsig residents allocated the highest amount to Housing, followed by education, job creation and WNR conservation. Health and Welfare was placed fifth. Money allocated to these themes was not significantly more than that allocated to WNR conservation. Tafelsig residents allocated significantly more money to WNR conservation than to religious buildings, transport, small business development, burial grounds and ecotourism.. Housing was allocated significantly more than all other themes, but not significantly more than education ($p=0.21$), job creation ($p=0.40$) or WNR conservation ($p=0.07$). It is noteworthy that Tafelsig residents allocated <1% of the funding to eco-tourism.

Harare residents' allocated the highest proportion of money to Job creation, followed by housing, education, Health and Welfare and WNR conservation in second to fifth place, respectively. For Harare residents, allocation for WNR was significantly lower than that for Job creation, housing and education. Allocation to WNR was significantly higher than Religious buildings, transport and burial grounds. WNR allocation was not significantly ahead of Health and Welfare, crime, or any of the remaining options. Harare residents allocated about 6% of the funds to eco-tourism.

Table 5.3.7. Proposed average (\pm std. dev.) allocation per 13 community development themes from a total of R1 million (Allocation in '000's) prioritized by Tafelsig ($n = 31$) and Harare ($n = 30$) residents. Significant differences between options within Tafelsig and Harare residents calculated using the sign test and in each case are compared with "Wolfgat conservation". The sign test was then again used to calculate significant differences between Tafelsig and Harare residents, per development option. NS= not significant, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Community development theme	Tafelsig			Harare			P between
	Mean	SD	P within	Mean	SD	P within	
Housing	161	131	NS	193	126	***	NS
Education	140	133	NS	147	108	**	NS
Job creation	138	106	NS	198	122	***	*
Wolfgat conservation	132	140	---	68	75	---	NS
Health and Welfare	104	88	NS	85	66	NS	NS
Crime	83	73	NS	55	67	NS	NS
Social Development (Food for needy)	73	68	NS	62	81	NS	NS
Building materials	64	78	NS	37	60	NS	NS
Religious buildings	54	62	*	13	34	**	*
Transport	29	46	**	17	37	**	NS
Small business development	10	30	**	65	75	NS	**
Burial grounds	10	30	**	2	9	***	NS
Eco-tourism	2	12	**	58	81	NS	***
Totals	1000			1000			

When comparing each community development theme between the two groups, there were no significant differences for 9 of the 13 options. The exceptions were that Tafelsig residents allocated a significantly higher amount to religious buildings (4 times as much) than did Harare residents. Harare residents allocated significantly higher amounts to Job creation (43% more), small business development (6 times as much) and eco-tourism (26 times as much).

While both groups listed Wolfgat as part of their five main priorities, Tafelsig residents allocated almost double (13%) the amount to Wolfgat conservation than did Harare residents (7%). Both groups made a higher allocation to Wolfgat conservation than to crime prevention, which was allocated 8% and 6% by Tafelsig and Harare residents respectively. It is interesting to note that 100% of residents in both groups agreed that businesses in the local community should also give some money to upgrade Wolfgat.

3.3.2. *The role of Wolfgat in relation to other community development themes*

When asked “*with which options can Wolfgat help?*” about half (48%) of Tafelsig residents cited Education as their first, 29% cited Health and Welfare as their second, and 23% cited Employment as their third option (Table 5.3.8). In contrast, about three quarter (73%) of Harare residents suggested that Wolfgat first could help with employment, 67% suggested Education and 37% suggested WNR helping with Health and Welfare as their third option. It was interesting to note that “*harvesting herbs for cheaper medicines*” was suggested by about one third of respondents in each group. Within group analysis show that Tafelsig residents rated Employment similar to Environmental Education, Health and Welfare and the Harvesting of herbs. However, they rated Employment significantly higher than the other remaining options. Within group analysis show that Harare residents rated Employment similar to Environmental Education, but significantly higher than all the other remaining options.

Within-group analyses did not reveal any significant differences relative to environmental education, in both groups. Contingency tables showed that a significantly higher proportion of lower income earners ($\chi^2 = 9.24$, $df=1$, $p=0.02$) who responded preferred harvesting herbs for cheaper medicines.

Table 5.3.8. The rank order of importance of nine development options in which Tafelsig ($n=31$) and Harare ($n=30$) residents see Wolfgat playing a role. Values are expressed as a percentage and rounded up. Significant differences between options within Tafelsig and Harare residents calculated using the Wilcoxon-matched pairs test and in each case are compared with the most important option i.e. “*Employment*”. NS= not significant, * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Development option with which WNR could help	Tafelsig				Harare			
	1st	2nd	3rd	P	1st	2nd	3rd	P
Environmental education	48	19	19	NS	3	67	27	NS
Employment	42	16	23	---	73	17	7	---
Health and Welfare-(relaxation for mental health & physical fitness)	3	29	26	NS	0	0	37	**
Recreation to reduce crime	3	16	0	*	0	0	0	***
Small business development by harvesting natural products like firewood	0	6	0	**	0	7	0	**
Tourism to create employment	0	0	0	***	0	3	10	**
Contribute to food for the needy	0	0	6	***	0	0	0	***
Housing	0	0	0	***	0	0	3	***
Harvesting herbs for cheaper medicines	3	13	26	NS	23	7	17	*

When asked “ *how Wolfgat could address these factors*”, both groups agreed that educationally, practicing Environmental education by using the area as an outdoor classroom to do curriculum-based work would also be a way to help the community. About 30% more Harare residents than Tafelsig residents indicated that providing employment via the upgrading with facilities, removing invading alien plants and maintaining the area was the manner in which the area could help the community. These findings for Harare corroborated findings for how WNR can benefit the community in section 3.2.2.3 of this study.

3.3.3. Factors influencing funding towards its conservation

Analyses were done on ten independent socio-economic variables to determine which would contribute to a variation in willingness to allocate community and personal funds towards WNR conservation. A summary is provided in Table 5.3.9 for those three variables where respondents showed a significant variation in willingness. The community and personal funding questions were tested in Section C of the questionnaire.

Table 5.3.9. Results of χ^2 tests for three socio-economic factors associated with allocation of community development funds and own personal funds towards Wolfgat conservation. This was done by grouping related statements on funding in Sections C and D of the questionnaire, to test attitudes to funding Wolfgat conservation. Mean allocation is that found in Table 5.3.7. (i.e. for Tafelsig residents = R132 000 and for Harare residents = R68 000). Significance values; NS= not significant, * $p<0.05$, ** $p<0.01$.

Willingness to contribute financially to WNR conservation	Occupation -unemployed -semi-skilled -skilled	Residence Time (years) Tafelsig mean = 9 years -Harare mean = 6 years	Educational Level - primary - secondary - tertiary
<i>Willingness to allocate above the mean of community development funds</i>			
Tafelsig residents	NS	7.3 **	NS
Harare residents	NS	5.0 *	3.8 *
<i>Willingness to pay an extra R1 on property rates monthly if it will assist with upgrading WNR</i>			
Tafelsig residents	NS	NS	NS
Harare residents	4.8 *	5.0 *	NS

When respondents in both groups were presented with the attitudinal statement “*If the local authority is to receive money for community development, part of the money should be used to upgrade WNR*”, 87% of Tafelsig and 50% of Harare residents agreed with the statement. Willingness to allocate community development funds above the mean were significantly associated with the time residing in the area for both Tafelsig and Harare, as well as the educational level in Harare. In Tafelsig, all residents who have resided there >9 years, were

more willing than those who resided in Tafelsig <9 years, to allocate above the mean of community development money to WNR. In Harare, a higher proportion who had resided there longer (>6 years) were more willing to allocate >mean of community development money to WNR. The majority of those who resided there <6 years (30%), were unwilling. A significantly higher proportion of Harare residents of higher educational level (had attended high school compared to those who had attended primary school) were more willing to allocate above the mean of community development money to WNR.

Willingness to allocate personal funds were determined by comparing the independent variables with responses to the statement “ *Residents in the community should pay an extra R1.00 on their rates monthly if it is to assist with the upgrade of WNR*”. Results revealed that 71% of Tafelsig and 44% of Harare residents agreed with this statement. Occupation and residence time contributed to variation in willingness to pay from personal funds. This was only found in responses from Harare residents. The majority of unemployed Harare residents were unwilling to contribute from personal funds (78% of the unemployed). The majority of semi-skilled (70% of the semi-skilled) and skilled (70% of the skilled) were willing to contribute from personal funds. When comparing unemployed versus employed, a significantly higher proportion ($\chi^2 = 4.82$, $p = 0.03$) of the employed were willing to pay. A significantly higher proportion of Harare residents residing < 6 years were unwilling, while a significantly higher proportion residing >6 years were willing, to pay from personal funds to upgrade WNR.

3.4. Crucial conservation and management issues

3.4.1. Attitudes to WNR conservation

Attitudes to WNR conservation showed that although all respondents in both groups supported the retention of WNR as a reserve, about a third in Tafelsig and a fifth in Harare felt that part of it could be used to build facilities for the community (Table 5.3.10). However, the overwhelming majority in both groups felt that keeping it for their children was more important than developing facilities on the reserve. Both groups did not differ significantly on all three issues.

Table 5.3.10. Statements used to determine attitudes to conservation of WNR between Tafelsig ($n=31$) and Harare ($n=30$) residents. Categories collapsed into A= agree, N = Neutral, and D = disagree. Values expressed as a percentage. Significant differences between Tafelsig and Harare residents calculated using the χ^2 test. Test done on Agree versus Neutral/ Disagree. Significance values; NS= not significant.

Statements	Tafelsig			Harare			P
	A	N	D	A	N	D	
1. It is worth keeping Wolfgat as a nature reserve	100	0	0	100	0	0	NS
2. Wolfgat is a waste of land. Part of it should be used to build facilities for the community	32	0	68	20	0	80	NS
3. It is more important to keep Wolfgat for our children than to develop facilities on the land	90	7	3	100	0	0	NS

3.4.2. Perceptions of the management authority

To determine perceptions of the management authority, respondents were asked if they were aware of *what management functions City Council officials a) do in Wolfgat; b) how well they do it and c) how important it*

was for them to do it. This pertained to aspects such as keeping the area clean, protecting citizens from criminals, protecting plants and animals, preventing hunting, attracting tourists and keeping people from using the area (see Appendix 14a,b,c for detailed results).

In contrast to Tafelsig residents, none of the Harare residents felt that they could take a stand on what the City Council officials do, or how well they do it (Appendix 14a). Generally, just over half of Tafelsig residents stated that they did not know what City Council officials do in WNR (an average of 52% of respondents for the six issues) Tafelsig residents were divided as to whether City Council kept the area clean. About one third of respondents felt that they kept the area clean, another third disagreed and 36% did not know. As to protecting citizens who visit WNR from criminals, 10% agreed, almost half (48%) disagreed, 42% did not know. With regard to protecting plants and animals, 19% felt that the City Council did this and 58% did not know. Sixteen percent felt that the City Council prevented hunting, while 61% did not know. As to whether the City Council attracted tourists to the area, 32% felt that they did not, while 58% did not know. About one third felt that the City Council did not keep people from using the area, and just over half of respondents were unaware of the City Council kept people from using the area.

As to how well the City Council carried out its functions (Appendix 14b), a low percentage of Tafelsig residents (an average of 12% of respondents for the six issues) felt that they did it poorly, while about three quarters of Tafelsig residents felt that they did it very poorly (an average of 73% of respondents for the six issues).

As to how important it is for officials to carry out their functions (Appendix 14c), a higher proportion of Harare compared to Tafelsig residents felt it was very important for them to carry out their functions (an average of 83% for Harare residents compared to 61% for Tafelsig residents, respectively, for the first five issues). In each case, Harare residents felt more strongly about the issue than did Tafelsig residents. However, what is important was that the majority in both groups felt that it was important to keep the area clean, protect citizens, protect plants and animals, prevent hunting and attract tourists to the area. While the majority in both groups felt that officials should allow people to use the area, Tafelsig residents felt significantly stronger about this than did Harare residents. The majority of Tafelsig residents interviewed made reference to working with the local community in order to allow residents to benefit from WNR via recreation, environmental education and tourism. Harare residents were divided in that about one third felt that this was important to keep people from using the area in order to protect the natural resources and wildlife. The 62% that felt that it was not important all indicated that officials should work with the community by providing employment opportunities by clearing the bush, remove wood for firewood and provide opportunities in tourism.

3.4.3. Community involvement in management

In order to inform respondents in both communities about WNR as a prerequisite for them to become involved, respondents were asked how they would like to be informed about WNR. They were also asked what the content of such information should contain. The majority of Tafelsig residents (64%) were in favour of television to inform them about information on plants and animals found there, its scenic beauty and facilities that can contribute to visits there. The majority (94%) of Harare residents opposed television, and preferred to be informed via community meetings where they could obtain information about employment opportunities and how they could protect the plants and animals.

When asked if they "*would you like to become involved in Wolfgat conservation?*" a significantly higher ($p < 0.05$) percentage of Tafelsig residents (61%) were willing compared to the 31% of Harare. Positive reasons provided by willing Tafelsig residents were that they wanted to be educated and gain more information about WNR. Positive responses from Harare residents were that they foresee employment opportunities. Negative responses from

Tafelsig residents included that they did not know how safe the area was and that they did not know how to use WNR. Negative responses from Harare residents were that they did not know the area or who managed the area, how to use it, as they have never visited WNR.

For the future, the majority (90%) of Tafelsig residents indicated that they should be consulted regarding WNR conservation matters. In contrast, the majority (97%) of Harare residents stated that consultation should happen via community leaders who head community structures such as street and area committees.

4. Discussion

4.1 The role of the reserve

4.1.1. Current levels of use and factors that affect it

After conserving its ecological integrity, the main aim of the Environmental Management Plan of WNR (City of Cape Town, 2001) is to encourage adjacent communities to use the area in a sustainable manner. WNR managers also would like residents of these adjacent communities to become future stewards of WNR (Davis, 2005). The results of this study indicate that in WNR's present state, just over half of Tafelsig residents will use WNR over various levels of frequency while none of Harare residents will use WNR. For Tafelsig residents, recreation and the enjoyment of nature are the main reasons cited for using WNR in its present non-upgraded state. This indicates that at the time of this study, the management of WNR still reflected the Apartheid style conservation approach that did not involve black communities (i.e. those from Harare) in policy setting and management relating to the use of PAs (Luckett et al., 2003). The results also suggest that at present, adjacent residents of Tafelsig experience little and Harare residents do not experience any immediate and tangible benefits from WNR, such as harvesting resources such as firewood, which is similar to the permitted harvesting of thatch in Nepal's Chitwan National Park (Mishra, 1982). It also suggests that there is a very weak and no association respectively between the conservation of WNR and the socio-economic welfare of coloured residents in Tafelsig and black residents in Harare. This is consistent with the findings of Infield (1988) for a black community adjacent to the Umfolozi/Hluhluwe/Corridor Complex in KwaZulu-Natal, South Africa. Studies in Australia have also shown that culturally different urban communities adjacent to PAs perceive conservation of such areas positively if these areas provide benefits which will improve their quality of life and provide a place for social, cultural, recreational and educational activities (Hamilton-Smith, 2001; Conner, 2005). The finding that perceptions of local, culturally-different adjacent communities markedly improved towards the Greater St. Lucia Wetland Park after an improved understanding of the GSLWP's purpose (Picard, 2003) suggests that improving attitudes towards WNR and an understanding of WNR's purpose in

its present state could take place via improved communication and education programmes in both the Tafelsig and Harare communities. This strategy to improve understanding and create a positive image of the area should be used to initiate a stewardship programme and should focus on the cultural and historical value of WNR. It does not necessarily require the reserve to be developed as has been shown in successful urban PAs in Brazil (da cunha e Menezes, 2005; cited in Trzyna, 2005). However, the lack of development can explain why many Tafelsig respondents did not want to use WNR and had negative comments such as “there are no facilities and it’s neglected”. The current work of the Cape Flats Nature (CFN) initiative to develop local leadership and capacity in both adjacent communities provides essential steps in developing a stewardship programme for WNR (Davis, 2005).

Should WNR remain undeveloped, however, a discussion of factors that keep adjacent residents from using the area, and how these factors can be overcome would prove valuable for its ongoing current use. Findings indicate that while the perception of crime and rubbish dumping are the main reasons why Tafelsig and Harare residents are staying away from WNR, the perception and recommendation by both groups is promising; namely that these drawbacks can be solved via patrols who can work with the local police. This need for patrols could present an opportunity to involve residents in WNR management, and provide benefits to the adjacent communities via training opportunities and skills. Via a partnership between Reserve management, residents of Tafelsig and Harare, and the South African government’s Department of Labour, volunteers could be trained to carry out patrols. This would take place via the Sector Education and Training Authorities, which forms part of the state’s Human Resource Development strategy (Department of Education, 2001). The involvement of volunteers in PA management has been shown to be a key in a community-driven stewardship initiative of a PA in Australia (Parker and Punturiero, 2005). Should the availability of patrols and guides be publicized in the local media in both communities, the significantly more residents who had not visited WNR before and those who viewed crime as a threat in using WNR, might well consider to use WNR which would lead to improved attitudes to the conservation of WNR.

Responses to rubbish dumping acting as a drawback to using WNR in its current state indicate that educational level did not affect Tafelsig residents but did affect Harare residents. This suggests that Tafelsig residents were more apathetic to rubbish dumping than Harare residents. In Harare, residents who completed high school perceived rubbish dumping as a drawback to using WNR more seriously than Harare residents who completed primary school. This suggests that by decreasing the level of pollution in WNR, more educated black residents might be attracted to the reserve, and that a dirty environment separates more educated black

residents from using WNR which would make them less inclined to provide political support for the conservation of a PA such as WNR (Trzyna, 2005). Data shows that the overwhelming majority of both Tafelsig (87%) and Harare (100%) residents agreed that people dumping rubbish in Wolfgat should be punished by paying a fine. This is consistent with findings of Preston (1989) who found that 77-81% of visitors to four South African nature reserves supported the principle that polluters should pay. This also suggests that their agreement to this principle can be accepted as compatible with community involvement in pollution management in WNR (Parker and Punturiero, 2005).

Data presented show that that younger Tafelsig and Harare residents felt that lack of patrols and the lack of information acted as drawbacks to them currently using the area. This suggests that the availability of patrols will contribute to young coloured and black youth using a nature area such as WNR and that more should be done to promote the attributes of WNR in local media to the youth. Informal interviews with residents of both communities have indicated that they share a great concern about the moral and personal development of their youth. The use of a nature area such as WNR by the youth could benefit the youth in each community in that contact with nature has been shown to be essential for healthy intellectual, emotional and moral development (Kahn and Kellert, 2002), provides opportunities for activities such as exercise when youth clubs use WNR, developing self-esteem and contributes to local knowledge and pride of place and heritage (Hamilton-Smith, 2001). The potential involvement of adjacent community youth is currently undetermined and should form an important part of a stewardship programme.

Evidence presented that older, more educated Tafelsig and Harare residents who had studied Biology, did not feel that the thick bush acted as a drawback to using WNR, suggests that they had a greater understanding of the urban natural environment and did not fear using it. The majority of older Tafelsig residents indicated that many of them had harvested firewood from the bush when they were growing up. More educated residents in both groups indicated that they understood that the bushes were alien plants which management could remove. The greater need for employment in Harare was evidenced when twice the amount of Harare than Tafelsig residents felt that a job-creation programme, similar to that of the South African *Working for Water Programme* (van Wilgen et al., 1998) should be commenced to remove the invading alien plants that gives the impression of a bush. Unemployed Harare residents did not feel that the bushiness acts as a drawback as the majority indicated that the bush was a consumptive resource which could benefit them. Allowing sustainable harvesting of the bush as part of a programme which educates harvesters of the benefits of WNR might well lead to unemployed Harare residents perceiving the conservation of WNR in a more positive light.

4.1.2. Future levels and types of use if upgraded

If upgraded, the overwhelming majority of Tafelsig and Harare residents respectively, indicated that they would use the area often (at least once per month). The finding that about five times more people from Tafelsig can be expected to visit WNR on a monthly basis in an upgraded than in its current state suggests that the utilization programmes and staff capacity will have to be structured to accommodate increased visitation numbers. Data presented that about three times more Harare than Tafelsig residents can be expected once per month suggests that utilization programmes will have to be structured to accommodate different language, cultural and experiential needs of these two communities to ensure their ongoing support for the conservation of WNR. These findings indicate that WNR management will have to develop effective visitor management strategies for high-use with an emphasis on different cultural groups, as has been successfully done for California's PAs where staff of different ethnic groups have been employed to address the lack of ethnic diversity amongst staff and minimize the discomfort ethnic visitors feel because they see few people like themselves amongst staff (Trzyna, 2001). CFN should also integrate lessons taken from the Mosaic Project in the United Kingdom (Memon, 2005; cited in Trzyna, 2005), where a Non-governmental Organisation (NGO) called the Black Environmental Network (BEN) linked different ethnic groups with national parks. By similarly first establishing the cultural and social needs, and formulating the meaning and benefits of visitation programmes to the different ethnic communities, cultural and experiential needs of the Tafelsig and Harare communities can also be met. The importance of the involvement of a conservation NGO in facilitating the use of WNR by the two culturally different communities should not be underestimated, as it has been shown to be a highly successful management strategy in urban PAs in California, the United Kingdom and Argentina (Trzyna, 2001; Trzyna, 2005).

The finding that Tafelsig and Harare residents differed in giving the highest rank value for non-consumptive use of WNR to Environmental Education (EE) and Nature Protection respectively, was probably due to the greater awareness created amongst Tafelsig residents by the local community newspaper (Burbidge, 1995) that Mitchells Plain schools used WNR for EE in 1995. Khayelitsha schools never used WNR for EE prior to this study. As most Harare residents did not know about WNR prior to this study, it probably accounted for their perception that a nature area such as WNR should be used for Nature Protection (Jackelmann and Britton, 1995). This study has also shown that urban Tafelsig and Harare residents value protection of nature two to three times higher than rural residents adjacent to five protected areas in Tanzania (Newmark et al., 1993).

The greatest support from both Tafelsig and Harare residents focused consumptive use

primarily around eco-tourism. Residents in both communities perceived a positive association between using WNR for tourism and their personal economic welfare and as beneficial to their community. These findings are consistent with that found by Picard (2003) for three black communities adjacent to the Greater St Lucia Wetland Park (GSLWP), regardless of community in which they resided (100% in each community perceived this association). It strongly contrasts with that found by Infield (1988) who found that only 4 out of 151 persons perceived a positive link between tourism and local employment, and only 33% agreed with the statement that tourist will benefit the community. This indicates that in a post-apartheid South Africa, local communities such as those adjacent to the GSLWP and to lowland fynbos areas such as WNR, perceive tourism as a form of employment generation and revenue for themselves. Ensuring that these adjacent communities retain tourism benefits not available to outsiders, as perceived by communities in the study by Infield (1988), would foster local stewardship for conservation as found in the Periyar Tiger reserve in India (Uniyal and Zacharias, 2001). Through a participatory designed eco-development strategy, park staff engaged local support where local communities benefit first from providing pilgrims with facilities who visited the area, and have been able to reduce pressure on park resources.

For ecotourism to become sustainable in WNR, residents of the adjacent communities of Tafelsig and Harare should not be alienated from the reserve (Shackley, 1996), but should be integrally involved and actively participate with other stakeholders in planning, making decisions and should be part of the labour force (Heywood, 1995). Studies elsewhere have shown that local community participation is paramount for the success and sustainability of an ecotourism project (Kruger, 2005). Local conditions will provide an indication of political stability and safety (Wells, 1993). Kruger (2005) has found that the exclusion of adjacent communities from the economic benefits derived from tourism led either to increased poaching or other forms of consumptive landuse, especially where there is a lack of a flagship species, such as found in WNR. WNR management should therefore take the lead with the adjacent Tafelsig and Harare communities to demonstrate that the reserve has an appropriate infrastructure and that access to the reserve is safe. They also need an effective marketing and communications plan (Jha, 2005; Kruger, 2005). Such a project should be financially viable and use residents in the culturally different communities of Tafelsig and Harare to meet the needs of visitors from different cultures (Kruger, 2005). In order for ecotourism to be sustainable and manageable for Tafelsig and Harare communities, it should be small-scale and locally operated or owned (Weaver, 1991). This would minimize leakages (Leader-Williams, 2002) and allow adjacent residents to supply goods and services (Boo, 1990; Goodwin, 1996). In a study of residents adjacent to Chitwan Park in Nepal, for example, it has been found that small-scale ecotourism businesses account for

between 55 and 66% of revenues (Wells, 1993). WNR management should also take the lead in developing a community-based tourism policy and brochures for WNR where tourists could overnight at the “entrance” to WNR, as been found in the Ndumo Game Reserve in Mozambique (Pollock, 1994) and experience bed and breakfast in culturally different homes of Tafelsig and Harare, as found in PAs in Namibia (Ashley, 1995). This would contribute to poverty alleviation and diversify the income base in each community. Such an ecotourism strategy has also been found to be successful in local communities living in and adjacent to the Maputo Elephant Reserve in Mozambique (Soto et al., 2001).

A study should be undertaken to see how eco-tourism in these two local communities adjacent to WNR can become sustainable and achieve social and sustainable economic development. Such a study should draw upon lessons from other PA contexts, such as those in California, USA (de Los Monteros, 2002). The sustainable provision of different traditional experiences should also form an important focus in such a tourism study. To date, there are no tourism initiatives owned or managed by any Tafelsig or Harare residents, and unemployment in both communities remains high (>50% in both communities). Tourism-related benefits continue to accrue to operators from outside these communities. Ecotourism activities in PAs of Baja, California, USA, which benefits tourism operators have been shown to benefit conservation, but were not comparable to the costs involved in the conservation of the PAs (de Los Monteros, 2002). For ecotourism to be an effective conservation strategy in WNR, WNR managers should select tourism operators from within each of the adjacent communities and ensure that tour operators are regulated according to a jointly agreed upon tourism policy and share the costs and benefits of environmental services (the PA). In the California study, tourism operators did this by promoting the PAs, assisting local schools with EE and educational trips to the PAs, by assisting with cleanup campaigns and by providing logistical support to research and management programmes (de Los Monteros, 2002). In addition, WNR managers must ensure that any benefits accruing from ecotourism should be decided upon in a forum in which sectoral representatives participate actively in deciding how to disburse such benefits. Such an approach has been found to work well in PAs in Kwazulu-Natal, South Africa (Luckett et al., 2003).

The finding that about 40% of Harare residents would like to use WNR for an initiation area, after eco-tourism depicts the cultural diversity of the two adjacent communities. Culturally, black South Africans have a “rights of passage” tradition where young men are circumcised and spend an extended time in the “bush”. They hunt and live off natural resources. While an area has been set aside for initiation practices in another lowland fynbos PA called Driftsands (Stanvliet, 2004), the practice of initiation is illegal in WNR. This suggests that WNR

management should educate the Harare community about alternative sites and the greater biodiversity value of the area for education and other forms of non-consumptive uses.

Facilities mentioned by both groups which would benefit the community are consistent with those found by Khan (1994) who suggested that WNR is best developed as a multi-purpose area, where the main emphasis is on non-consumptive uses such as EE and recreation. It is clear that the development and upgrading of WNR should make use of local labour as part of WNR's community outreach programme. Creating employment opportunities could improve attitudes towards WNR managers in both communities. Results from similar studies in Tanzania (Gillingham and Lee, 1999) and at the GSWP in South Africa (Picard, 2003) respectively, confirm that attitudes to PA managers are positively and negatively influenced by the benefits local communities receive from PA managers.

Findings for Tafelsig and Harare residents related to the bequest value of WNR which reflected a predominantly utilitarian view, is similar to residents adjacent to five Tanzanian nature reserves (Newmark et al., 1993) and Zulu residents adjacent to the GSLWP in Kwazulu-Natal, South Africa (Picard, 2003), where only 9% and 17% respectively, wanted the area to be conserved for future generations. These findings are all contrary to the notion that the majority of poor residents adjacent to PA's are not concerned with biodiversity conservation (Terborgh et al., 2002). The finding that a minority of Tafelsig residents and a high proportion of Harare residents agreed to harvest wildflowers from WNR, even with a licence, highlights the fragility of communication between WNR management and both adjacent communities, especially the Harare community. It suggests that residents in both communities were unaware of the policy that states that the harvesting of plants was illegal. It also confirms the observations that EE programmes and sensitization via the local media by the managing authority is lacking in both, but more so in the Harare than in the Tafelsig community.

The above findings that both culturally-different communities of Tafelsig and Harare support using WNR for non-consumptive purposes such as EE, recreation and other non-material values such as heritage, spiritual and cultural values are consistent with findings for PAs in Peru (Andrade, 2000) and Australia (English, 2000). It suggests that heritage and cultural guidelines should be developed and incorporated into the Environmental Management Plan of WNR through active participation of residents in the culturally-different communities of Tafelsig and Harare. Guidelines for managing PAs having spiritual and cultural significance (Hamilton, 2000) and recreational (such as experiencing solitude and natural sounds) and aesthetic values (Tranel, 2000) have been reported, which could assist in this process.

The finding that the majority of Harare residents of all occupational classes, and those watching TV or not, indicated that they would not visit the area for recreation could be explained by the fact that the majority are unemployed and do not have TV's. Findings that in Harare, younger residents are more likely to use the area for relaxation/scenery than older residents was corroborated by findings that younger residents tended to have higher educational levels than older residents. Younger residents also had greater access to education than in the past, and less set in their ways. These findings are similar to those found by Fiallo and Jacobson(1995) for residents adjacent to Machalilla National Park in Ecuador and at Kosi Tappu Wildlife Reserve in Nepal. Findings show that Tafelsig residents who were settled there longer were associated with wanting to use WNR for relaxation/scenery than more recently settled residents who did not want to use WNR for relaxation/scenery. This was probably because they had already visited WNR for relaxation/.scenery before and evidence found in interviews that more recently settled residents had less time for relaxation/scenery and a greater and more immediate need to first establish themselves in Tafelsig.

4.2. Prioritisation of, and the role of Wolfgat in relation to other socio-economic development themes

4.2.1. *Allocation of funding, the ranking of community development options with Wolfgat a part of the options and how WNR can benefit the community?*

The results of this study show that Tafelsig and Harare residents allocated the highest proportion of community development funds to Housing and Employment, respectively. While WNR is not able to address housing, as it does not form part of its management plan (City of Cape Town, 2001), other priorities such as Education and Health and Welfare have been identified by both groups as part of the first five priorities which includes WNR lower on the scale. While WNR would not be able to meet all the socio-economic needs of residents in Tafelsig and Harare, results of this study should be seen as contributing to a broader participation framework which is a pre-requisite for integration into WNR management policies and integrated community development plans (ICDPs) (MacKinnon, 2001).

The finding that Tafelsig residents allocated almost twice as much to WNR conservation than did Harare residents suggests that Tafelsig residents perceive greater benefits from the area, are more aware of WNR, and have gained more prior information of the area. In Tafelsig, where WNR is visible with the naked eye, many newspaper articles have consistently focussed on education during 1995-1996 (e.g. Burbidge, 1995; De Bruin, 1996). It explains why perceived benefits suggested by residents was for Education by using the area as an

outdoor classroom to do curricular based work. In Harare, WNR is not visible with the naked eye and no information was disseminated via community media in 1995-1996. In Harare, perceived benefits suggested by the majority of residents was that Wolfgat could assist with employment creation provides an indication of the growing state of poverty in this community.

A survey carried out by Davies (1993) on communities neighbouring the Pilansberg National Park shows that while the majority of respondents supported the use of taxpayers money for park conservation, priorities were given to defence and police, education, health and agriculture. Conservation was ranked far below these priorities. The relatively low priority of conservation identified in Davies (1993) is in contrast to that found for Tafelsig and Harare and suggests that priorities are contextual at a local level. It also re-inforces the notion that there is no alternative if PAs are to continue, unless they involve and demonstrate benefits to local communities in context as well as address other local community development themes. Lessons should be learnt from other community conservation initiatives in South Africa. In the first initiative reported on for the Pilansberg National Park (Davies, 1993) benefits such as job creation (600 jobs have been created in the park and its lodges); allocation of small contracts for development and maintenance; EE (10 000 schoolchildren have visited the park during 1983-1993); access provided to herbalist to gather medicinal plants; and involvement in management decision-making, are being extended from PAs into local communities. In the second initiative reported on for the Kruger National Park (Venter et al., 1994), the park has addressed local development themes such as education and training through capacity building of rural residents to participate in sustainable development projects and park management; job creation programmes to develop the park; EE through “the kids in Kruger” programme, health and welfare by providing medicinal plants to traditional healers, as well as harvesting selective resources inside the park for community use.

This study has shown that priorities identified by Tafelsig and Harare residents (i.e. EE and Employment, respectively), could practically be implemented as part of an ICDP at WNR. By building local leadership and management capacity with residents of Tafelsig and Harare, through initiatives such as Cape Nature, WNR can address local development themes. Results indicate that Tafelsig and Harare residents already support benefits such as EE, which is an integral part of the South African school curriculum (Department of Education, 1997a). Benefits through employment opportunities are available via upgrading the area and developing facilities such as the information centre, allowing harvesting of alien plants for firewood and expanding tourism to local operators. Results indicate that it would be more difficult to convince Harare than Tafelsig residents of viewing WNR as part of an ICDP

project as the majority of Tafelsig and a much lower proportion of Harare residents agreed with the statement that "...part of community development money should be spent on upgrading Wolfgat." To ensure success of an ICDP process involving WNR there should be two criteria. Firstly, there should be active participation by residents in each community, particularly from Harare residents, which entails the joint setting of clear conservation goals and objectives. Many community-based conservation programmes turn out to be "relational" rather than participatory (Murphree, 1994) and are rushed into, where stakeholders have conflicting agendas and expectations (MacKinnon, 2001). Secondly, the ICDP process should ensure benefits from use and involve residents from both communities in management, ensuring that the process move from being co-optive involving conservation for the people to one where responsibilities are decentralized and the ICDP process is ultimately run by a forum of broad stakeholders from the community - a process of conservation by the people (Murphree, 2000). Thirdly, the ICDP process should entail a viable long-term strategy where a WNR management committee should take the lead in working in partnership with government departments, the private sector and NGOs such as the Botanical Society in South Africa, in order to combine resources to provide opportunities to these adjacent communities on a meaningful scale (Wells, 1996). Such an approach has also been highly successful in California's urban PAs, where NGOs have also played a pivotal role (Trzyna, 2001). Such programmes also achieve greater social cohesion as reported for communities adjacent to urban PAs in Sydney, Australia (Brown, 2001) and London, United Kingdom (Phillips and Gay, 2001).

4.2.2. Factors influencing funding towards conservation of WNR

Willingness to spend part of community development funds on upgrading WNR was positively associated with longer residency lengths and higher educational levels. Tafelsig residents who lived >9 years and Harare residents who lived >6 years in the area were more positive to allocating part of community development funds to upgrade WNR. This suggests that long-term residents in both communities saw improving a natural area such as WNR as also improving their communities and quality of lives (Conner, 2005) than were shorter term residents who focused on more pressing socio-economic concerns, such as obtaining a house or job. Many longer term residents indicated that should an area like WNR be upgraded by using community development funds, their property values would increase. This perception is consistent with findings of Crompton (2003), who has shown that in many countries, the price of residential properties close to PAs is much higher, relative to more distant properties.

Although about twice as many Tafelsig than Harare residents were willing to allocate personal funds to assist in upgrading WNR, variation in willingness was only found amongst

Harare residents. This was negatively associated with unemployed residents and positively associated with those who had longer residency lengths. Negative attitudes to allocate personal funds to assist in upgrading WNR was probably due to the following. About half of Harare residents in this survey were classified as unemployed, which when coupled with the fact that the majority had income levels of less than R800/ month, probably explains why all unemployed residents in Harare were negatively disposed to the allocation of personal funds to assist in upgrading WNR. Their focus would be on meeting basic needs such as food and shelter (Maslow, 1954). These findings concur with that Wilkie et al. (2001) for citizens of Central African nations such as Cameroon, where it was found that allocations from personal funds via taxes are unlikely to generate significant revenues for PA conservation, as per capita income is generally low and thus willingness-to-pay for conservation would also be extremely limited.

4.3. Crucial conservation and management issues.

4.3.1. Attitudes to support its conservation

Findings in this study has shown that the overwhelming majority of residents in both Tafelsig and Harare communities supported the retention of Wolfgat as a nature reserve. Similar levels of support for the retention of PAs for conservation have been recorded in rural adjacent communities in Tanzania (Newmark and Leonard, 1991) and in Kwazulu-Natal, South Africa (Infield, 1988; Picard, 2003) as well as in urban Cape Flats communities adjacent to the Driftsands (Nguta, 1992) and Wolfgat (Khan 1994) nature reserves. The above findings all indicate that contrary to the assumptions that poor residents adjacent to PAs are not concerned with conservation (Oates, 1999; Terborgh et al, 2002), poor rural and urban communities adjacent to PAs do support conservation of such areas.

4.3.2. Perceptions of the management authority

While attitudes towards a PA are shaped by community perceptions (Holmes, 2003), local attitudes towards PA managers are influenced by two factors namely: the perceived familiarity which relates to the type and degree of interaction between community members and PA staff (Fiallo and Jacobson, 1995; Ite, 1996); and the presence or absence of types of services and benefits they receive from PA managers (Mehta and Kellert, 1998; Infield and Namara, 2001). Findings in this study show that while Harare residents were completely unfamiliar with what the local authority did in WNR or how well they did it, the majority of Tafelsig residents on average held either a negative or neutral attitude toward what the protected area employees did in WNR. This trend found amongst Tafelsig residents where conservation of the PA is supported, but there is a negative attitude towards local

conservation authorities and their actions are not known, is consistent with previous attitudinal studies for different ethnic communities adjacent to PAs, in Africa (see e.g. Nepal and Weber, 1995; Bauer, 2003; Holmes, 2003), and in South Africa (Infield, 1988; Picard, 2003). This distinction is important, because some studies have shown that while local residents have positive attitudes towards a PA, they expressed negative attitudes towards PA staff, which have often been misinterpreted as a lack of support toward conservation in general (Infield, 1998; Holmes, 2003). The findings in this study suggests that increased personal contact between WNR staff and residents of the Tafelsig and Harare communities would be critical to the development and trust between WNR staff and residents in these two adjacent communities (Hough, 1988). Holmes (2003) have found that different levels and types of contact between PA staff and two ethnic communities living adjacent to the Katavi National park in Tanzania resulted in differential resource use between the two communities. The above suggests that WNR management should jointly develop a community outreach programme with Tafelsig and Harare residents to ensure that the manner in which outreach efforts are recognized and the degree to which ethnicity influences this recognition leads to interactions that will benefit ethnic aspirations in each community and be beneficial to WNR conservation. In this regard, WNR staff should always ensure that their conduct in each community is of such a nature that leaves a positive impact on residents. Findings in other studies (Newmark et al., 1993; Holmes, 2003) lends support to the argument that visits by PA staff do not always have to be in an official capacity in order to be influential, and that even informal visits, such as talks at schools or interactions with youth groups, can have positive impacts on community perceptions about PAs and their staff.

Interviews conducted with Tafelsig and Harare residents indicated that only Tafelsig residents had some contact with WNR officials, knew of a community outreach project where local residents were employed to clear the alien plants in WNR, were aware of WNR and had visited WNR before. For Harare residents, it was the opposite. None of the interviewees had ever met a WNR official, did not know about employment at WNR, and only three individuals were aware of WNR and only one individual had ever visited WNR before. That Tafelsig and Harare residents varied in their recognition of WNR staff contact, is consistent with findings of Holmes (2003) for two ethnic communities adjacent to the Katavi National Park in Tanzania in that services and benefits were most likely the result of settlement patterns, and indirectly related to cultural differences. Tafelsig lies directly adjacent to WNR. Harare lies 2 km north-east from WNR and is separated by unoccupied land between itself and WNR. This settlement pattern makes using WNR (even just to cross it to go to the beach), recognizing activities in WNR, and interacting with WNR staff much more likely for Tafelsig than for Harare residents. As WNR staff have also interacted extensively with schools which

are within walking distance from WNR in Tafelsig and none in Harare, recognizing staff visits in Tafelsig rather than in Harare have been much more likely.

Results show that Harare and Tafelsig residents had different perceptions as to the purpose of WNR officials. Residents of Tafelsig associated WNR officials purpose with allowing them to benefit from WNR via recreation, EE and tourism. Harare residents associated WNR officials' purpose with regulating the natural resources by protecting wildlife and providing employment. Perceptions of Tafelsig residents are different, while that of Harare residents are similar to those recorded in Zambia and Kenya where local residents perceived conservation officials as doing their job well when they are protecting natural resources and are arresting people (Parry and Campbell, 1992; Akama et al., 1995), and in Kwazulu-Natal, South Africa, where they are perceived to be providing employment opportunities to local residents (Picard, 2003). These results suggest that attitudes to WNR managers are influenced by perceived familiarity and contact with WNR staff (Giilingham and Lee, 1999), differential settlement patterns of Tafelsig and Harare residents (Holmes, 2003) and the types of perceived benefits these culturally different residents receive (Picard, 2003) from WNR staff.

4.3.3. Community involvement in Wolfgat management

The data presented here are useful for directing the Environmental Management plan of WNR. It suggests how WNR management can embark on a process of participation which is seen by some as the key to any conservation strategy (Durban and Ralambo, 1994; Alpert, 1996; Heinen, 1996) in order to provide tangible benefits to each adjacent community. Findings that Tafelsig residents appear more willing than Harare residents to participate in WNR conservation, poses some basic questions such as:

- To what extent should each community benefit from WNR attributes and resources?
- How should the participation of each adjacent community in WNR management be structured?

A good starting point for such a process to demonstrate benefits should start with effectively informing residents of each community of the history, attributes, current uses and sustainable opportunities in WNR. Results of this study indicate that different communication packages need to be developed which need to be delivered in a different manner for each community. For Tafelsig residents, passive interaction via videos which focus on WNR attributes, activities to be done in WNR and an impression of safety in the reserve would prove most useful. For Harare residents, active participation via a meeting which focused on employment opportunities, resource protection and activities to be done in WNR would prove most useful.

The approach for Harare residents is consistent with the one used by Infield (2001). He explored important cultural values in PAs that had real meaning to the local community. This first step should act as a baseline for participation where representatives and stakeholders from each community have a mandate to take community ideas and needs forward to a joint community workshop. Lessons should be taken from the urban Otamendi Nature Reserve project strategy in Buenos Aires, Argentina (de Francesco, 2005; cited in Trzyna, 2005) where at least 30 persons from different sectors of society, including reserve volunteers and staff worked together on action plans which involved activities directly aimed at benefiting the local adjacent community. Community participation from Tafelsig and Harare communities in such a process should be based on sectoral representation, and not representation by community leaders as sole representatives of these culturally different communities. This could lead to problems as was found in PAs in Kwazulu-Natal, South Africa (Luckett et al., 2003), where the danger of losing the voice of small local groups (e.g. youth groups and resource user groups such as fisherfolk and craft co-operatives) is possible. Only by starting with such a process, will common ground be found between both communities as to what extent should each community benefit from WNR attributes and resources? The principle of collectively, negotiated and enforceable agreements (Brecht et al., 2002) provides promise for the equitable participation of both these culturally different communities in WNR management.

5. Concluding comments

In its present state, WNR would be used rarely by Tafelsig and not at all by Harare residents. It suggest WNR contributes very little and nothing respectively to the socio-economic welfare of Tafelsig and Harare residents. It contributes to recreation for Tafelsig residents, mainly to enjoy nature. An apartheid style management approach found at the time of the study where residents of especially Harare do not participate in policy setting and management of WNR will have to change if WNR is to benefit them, involve them as future stewards, and be used sustainably by them. Involving residents from both communities as volunteers to train them as patrols to combat the main factors of crime and rubbish dumping which keeps them from using WNR, should be seen as the first step to foster stewardship. Providing employment to clean and upgrade the area, especially to the Harare residents who want to use the bush (i.e. wood) consumptively, would further contribute to benefiting these adjacent communities.

If upgraded, utilization programmes should be based on a monthly timetable. Staff capacity will have to be increased and structured to accommodate different language, cultural and experiential needs of these two communities. Staff adequately trained in EE and communication skills should be appointed from these communities to reflect the cultural

diversity, minimize feelings of discomfort, and provide visitors from these communities with outdoor experiences in their own language and be able to relate these to their culture. This would lower discomfort levels of visitors from these communities, a phenomenon found amongst visitors to California's urban PAs due to seeing few people of their culture among staff (Trzyna, 2001). The importance of the involvement of a conservation NGO to facilitate the introduction to using WNR by the two culturally different communities should not be underestimated as a management strategy. Findings show that the area thus needs to be developed and upgraded as a multipurpose PA. It should start with the development of an information centre, which meets the EE and information needs of, and act as a centre for employment for, the adjacent communities.

Usage should focus on non-consumptive uses such as EE, Nature experiences that enhance the desire to protect nature and other non-material uses such as recreational, cultural, heritage and spiritual uses. Guidelines to incorporate these non-material uses into the policies of the management plan should draw on international lessons (see Hamilton, 2000; Tranel, 2000) and be explored by the adjacent residents with WNR officials. WNR management should educate Harare residents in their outreach programme that the area has greater biodiversity value for EE than for initiation in order to counter the perception that WNR management might not respect their cultural needs. WNR management should take the lead in a participatory study to explore sustainable ecotourism use which would not alienate residents in these adjacent communities but which strives to achieve social and economic development. Benefits accruing from ecotourism should be decided upon by representatives from different sectors in a forum which decides on how to disburse such benefits.

While an upgraded WNR cannot solve all the legacies of the apartheid past, and present socio-economic challenges of the adjacent communities, the greater allocation of funds by Tafelsig residents to WNR suggest that WNR is perceived as more important as a community development theme in Tafelsig than in Harare. Should WNR form part of an ICDP, it will have to deliver conservation-related benefits and build lasting support amongst adjacent communities. It suggests that once Harare residents experience benefits in an ICDP context, support for WNR and for allocating more funds to WNR will increase. It is clear that a viable long-term strategy would be for WNR management to take the lead in such a process, in partnership with relevant stakeholders which would result in a greater chance of success on a more meaningful scale. Partnerships around the benefits relating to EE and job creation (e.g. in the areas of education, alien plant management and community-based tourism), should be seen as the first step in delivering conservation-related benefits to the Tafelsig and Harare communities, respectively. It is unlikely that residents' personal contributions or even user

fees would generate sufficient revenues for WNR conservation. Funding for such ICDPs should not be from the WNR conservation budget. Increasing funding for the Work of Cape Flats Nature via the Cape Project could offer a solution. A trust fund for WNR conservation and ICDP projects involving WNR should be also explored. The establishment of trust funds for the effective management of PAs in Cameroon and in the Central African Republic through conservation NGOs such as Wildlife Conservation Society (WCS) have been explored, and Wilkie et al. (2001) estimate that \$19-20 million should be available via NGOs such as WCS for PAs around the world.

Despite serious economic challenges caused by unemployment and poverty, the majority in both groups supported WNR conservation which is contrary to arguments raised elsewhere (Oates, 1999; Terborgh et al., 2002) that poorer communities have little interest in conservation. The findings that Tafelsig residents were negative towards and were aware what WNR staff did, and had some contact compared to Harare residents who did not know what they did and had no contact suggests that adjacent community attitudes and interactions may be used to shape future WNR outreach initiatives in these two communities. The relative influence of culture suggests that a community outreach programme should initially focus on a different form of communication with Harare residents, as they have not had any contact with WNR staff to date, and are more likely to want to cut down the bush for subsistence. Consequently, Harare residents represent a greater ecological threat to WNR. This echoes the growing realization that conservation needs to extend beyond PA boundaries into the surrounding landscape (Western, 2001; Sanderson et al., 2002; Holmes, 2003).

Data indicates that involvement in WNR conservation will be challenging in both communities and may be more difficult in the Harare community. Findings indicate that a more westernized approach for Tafelsig residents versus a more African approach involving meetings (Buckle, 1995) for Harare residents would ensure that cultural differences are taken into account when involving these culturally different communities in WNR management. This should thus be seen as the first step in gaining their participation and involvement. Care should be taken that representation in WNR management of these two communities are not via their leaders alone, but that it is based on sectoral representation, as there exists a danger of losing voices of other stakeholder groups such as business, women and youth groups and other resource user groups (e.g. craft co-operatives). While Tafelsig and Harare residents represent an important stakeholder group to provide crucial baseline data on which to build evolving management policies, the attitudes of user groups which forms the focus for the next part of this study, is just as crucial to gain a holistic picture of the main stakeholder attitudes and perceptions towards WNR.

CHAPTER 5.4

USAGE, PREFERENCES, PERCEPTIONS AND KNOWLEDGE OF FOUR USER GROUPS OF THE WOLFGAT NATURE RESERVE

1. Introduction

The need to understand the usage, preferences, perceptions and knowledge of the main users of Wolfgat Nature Reserve (WNR) is the subject of this study. WNR faces threats such as creeping urbanization, illegal poaching and flower picking, alien vegetation and litter dumping and possible land invasions by the homeless. The area is used mainly by fisherfolk for recreational and subsistence fishing and by teachers and pupils of local schools for environmental education. Other users include members of the local community who use the area for recreation, harvesting of firewood and some individuals who harvest plants for sale or medicinal purposes. This study focuses on usage by fisherfolk and educational users.

Presently, WNR has a draft Environment Management Plan (City of Cape Town, 2001). Its two main goals are to conserve the natural systems and co-manage the area with the local community for environmental education and as a recreation resource for Cape Town's residents. It has ten management policies of which the utilization, public consultation and law enforcement and safety policies affects this study. According to these policies, utilization in this ecologically sensitive area should be sustainable and should not negatively affect the environment. In addition, education should be promoted, communities should be consulted as a commitment to their empowerment, and that all usage must happen in a safe environment.

If decisions are made about lowland fynbos protected areas such WNR with inadequate knowledge of user practices and attitudes then they are unlikely to be successful. Surveys of resource use patterns and attitudes can thus provide guidance for planning and management (see e.g. Harcourt et al., 1986, De Boer and Baquette, 1998). The aims of this survey were to determine: (1) Usage as related to the patterns of use, usage per user group, and factors which influence visitation to WNR, inside and outside WNR (2) the type of interpretation information and visitation programmes as well as land-uses that are preferred by each group, (3) what perceptions each group has as to the value of WNR and what they perceive as the main threats to its use, and (4) their understanding of conservation and knowledge of the flora

and fauna of the area. Implications for management of the area are also discussed in light of the above findings.

2. Methods

2.1. Study context and data analysis

The study area, management and socio-economic environment, are described in Chapter 2. The general approach and specific methods for this study on the main users is described in detail in Chapter 4, sections 4.2.3 and 4.2.4.3. Briefly, this study involved a comparative questionnaire survey of the usage, preferences, perceptions and knowledge of 50 fisherfolk, 40 teachers, 50 secondary and 100 primary school pupils who used WNR at the time of the study. Data for this study was obtained by analyzing parts A and B of the user questionnaire (see Appendix 5). Statistical methods and data analyses used are described in Chapter 4, section 4.2.5.

3. Results

3.1. Profile of user groups

The profile relates to five factors namely: (1) residency - i.e. living in Mitchells Plain or not; (2) age; (3) gender; (4) language; (5) Occupational level of fisherfolk and educational level of educational users.

In assessing place of residence, the majority (60%) of fisherfolk, about half (48%) of the teachers and all secondary and primary school pupils resided in the neighbouring community of Mitchells Plain. The remaining fisherfolk (40%) and teachers (52%) came from other parts of the Cape Flats. The mean age of fisherfolk was 38.7 ± 9.9 (range 13-63), teachers 34.7 ± 7.1 (range 24-47), secondary pupils 15.8 ± 0.8 (range 15-17) and primary pupils 12.6 ± 1.0 (range 11-15). The average teacher age was 38.8 ± 8.0 for males (range 24-48) and 34 ± 6.5 (range 26-45) for female teachers. Gender differences indicated that all fisherfolk were male, 40% teachers were male and in both secondary and primary school pupil groups, 50% were male and 50% were female. For language, the majority of fisherfolk (90%) were bilingual, 18% of teachers spoke English, 30% Afrikaans and 52% were bilingual. Forty four percent of secondary students were English speaking, 14% spoke Afrikaans and 42% were bilingual. In the primary school group, 37% spoke English, 53% Afrikaans and 10% were bilingual. Occupational levels indicated that 2% of fisherfolk were in a professional occupation, 38% were in service industries involving sales and technical services, 20% administrative, 18% in construction, 16% unemployed and 2% on pension. The remaining 4% comprised youth at school. Educational level results indicated that 8% of fisherfolk had completed grade 6, 66% had progressed to secondary school and 22% had completed grade 12. Four percent had

completed a 3-year diploma after grade 12. The 40 teachers had a total of 418 teaching years between them, with an average of 10.45 ± 6.4 teaching years per teacher (range 2-25). Education levels for teachers indicated that 73% held a three year post-matric diploma and 27% held a four year post-matric Honours degree. All secondary pupils were either in Grade 10 or 11 while 60% primary school pupils were in Grade 6 and 40% in Grade 7.

3.2. Usage

3.2.1. Usage patterns

Fisherfolk and primary school pupils use WNR most frequently, while teachers and secondary pupils use WNR least frequently (Table 5.4.1). A higher percentage of fisherfolk (74%) than primary school pupils (41%) have visited WNR at least once per month. About half (48%) of the teachers and the majority of the secondary school pupils (80%) have visited WNR once over the last year. The average fisherfolk has been coming to WNR for about 10 years, which was significantly longer ($p=0.03$, $d.f.=3$) than the other three user groups. Primary school pupils have been using WNR significantly longer ($p=0.04$, $d.f.=3$) than secondary pupils.

Table 5.4.1. Usage patterns for each user group when using WNR. Frequency patterns from highest to lowest (A to E). Values are expressed as a percentage and rounded up. Average length of visitation (\pm std. dev.) also shown.

User group		Frequency of visit (%)					Length of visitation
Type	Number per group	A (>2 times per month)	B (once per month)	C (once every 3 months)	D (twice per year)	E (once per year)	
Fisherfolk	50	58	16	12	6	8	10 ± 2.7
Teachers	40	5	5	23	20	48	1.7 ± 2.7
Secondary school pupils	50	2	4	4	10	80	1.1 ± 2.8
Primary school pupils	100	29	12	27	11	21	1.9 ± 2.8
Totals	240	25	10	18	12	35	

While 90% of teachers indicated that they use WNR over the spring and summer months, Table 5.4.2 shows that fisherfolk use WNR from October to August, and that the majority (about 60%) fish during the summer months of November to February. Twenty four (83%) of the 40 fisherfolk who live in the local community of Mitchells Plain indicated that they fish almost every day during the summer season, which they use for subsistence at home.

Table 5.4.2. Fishing patterns of fisherfolk over the period November 1995 to October 1996, derived from the question "In which season (month), do you fish the most?" Values are expressed as a percentage.

	Fishing period											
Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct
%	60	60	60	66	12	4	8	16	16	16	0	14

3.2.2. Other reasons for using WNR and enjoying their visit.

Of the two adult groups (Appendix 15a), all of the fisherfolk indicated that fishing was their primary reason for using the area, with 66% indicating relaxation as their second, and 60% enjoying the scenery as their third choice. Sixty six percent of teachers indicated that environmental education was the primary reason why they used the area. Relaxation was the preferred second choice (40% of teacher respondents), and enjoying the scenery and gaining exercise as joint third preference (36% of respondents). About two-thirds of the teachers clarified that their second and third choices constituted one combined choice, which was hiking. When assessing school pupils (Appendix 15b), the majority of school pupils in secondary schools preferred to use the area for environmental education (62% of responses), with relaxation and enjoying the scenery as their second and third choices, respectively. Primary school pupils gave the greatest support for using the area for environmental education (59 % of responses), followed by birdwatching (57% of responses) and enjoying the scenery (52% of responses).

Answers to the open-response question "What do you enjoy when visiting WNR?" are shown in Appendix 15c. Besides fishing being enjoyed by 40% of fisherfolk, this group also enjoyed other experiences such as relaxation (26%), the clean air, being close to nature and 14% indicated that they use the opportunity for family outings. The greatest support from teachers (40% of respondents) and secondary school pupils (30% of respondents) were "being close to nature". Primary school pupils gave the greatest support to "enjoying the plants" (40% of respondents). Two thirds of teachers (67%) clarified that enjoying WNR came through relaxation, being close to nature, the views, walking and exercise, when they were hiking.

3.2.3. Usage per group

3.2.3.1. Fisherfolk

Eight types of fish were identified as being caught by fisherfolk at WNR. During summer (November to February) 48% of respondents identified catching kabeljou (*Argyrosomus hololepidotus*), elf (*Pomatomus saltator*) (42%), steenbras (*Lithopgnathus mormyrus*) (36%) and kob (*Argyrosomus thorpei*) (48%). During winter (June to August), galjoen (*Coranicus*

capensis) (72% of respondents), dassie (*Diplodus sargus*) (32%), white stumpnose (*Rhabdosargus globiceps*) (24%) and zebra fish (*Diplodus cervinus*) (24%) were caught. The number caught per visit varied from 1 to 10 with a mean of 3.2 (± 1.9). The number of species of fish caught varied from 1 to 6 with a mean of about 3 species (2.9 ± 1.5) caught per visit. Fifty percent of fisherfolk obtained their bait at the fish shop in Mitchells Plain, 16% bought sardines and the remainder used glow-worms which they obtained by pumping them out of the sand at the neighbouring beaches of Monwabisi (28% of respondents) and Strandfontein (6% of respondents).

Attitudes of fisherfolk towards their fishing practice were examined using statements that respondents were asked to rate on a 1 to 5 Likert scale (Table 5.4.3). The majority of fisherfolk (84%) did not support the need for a permit to fish and 74% wanted to fish without restrictions. They also agreed that only fish large enough (96%), and a certain number (quota) (88%), should be caught. The majority (88%) thought the latter practice would be sustainable. They were divided as to whether a permit would help the number of fish being caught with 57% agreeing and 43% disagreeing. The majority (92%) supported the need to be consulted about upgrading WNR.

Table 5.4.3. Statements used to formulate an index of attitudes of fisherfolk ($n=50$) towards their fishing practice and percentage of responses to attitude statements. SA = strongly agree, A = agree, D = disagree, SD = strongly disagree and DN = don't know. Mean and Standard deviation also shown.

Statements	SA (1)	A (2)	D (3)	SD (4)	DN (5)	Mean	SD
Fishermen need a permit to catch fish at WNR	0	16	66	18	0	3.0	0.6
Only fish large enough should be caught, smaller fish should be thrown back to grow to its full size	4	92	4	0	0	2.0	0.3
Only a certain number should be caught so that enough remains to build up numbers again	0	88	6	6	0	2.2	0.5
If we catch a certain number, there will always be enough for the future	0	88	10	2	0	2.1	0.4
A permit will help the number of fish being caught	0	57	40	3	0	2.9	0.4
Fishermen must be allowed to fish without restrictions	2	72	26	0	0	2.2	0.5
Fishermen need to be fully consulted about upgrading WNR	2	90	2	6	0	2.1	0.5

Chi-squared analysis carried out to determine any relationships between socio-economic variables and attitudes to fishing practices of fisherfolk showed that age, length of visitation, and education significantly contributed to variation in attitudes (Table 5.4.4). A significantly higher proportion of fisherfolk below 38 years of age compared to those older than 38 years felt that only a certain number of fish should be caught per visit. A significantly higher proportion of those who visited WNR >10 years did not support the need for a permit. A significantly higher proportion of fisherfolk who had visited for less than 10 years (when compared to those who had visited WNR for more than 10 years) felt that they needed to be fully consulted about upgrading Wolfgat. Respondents with a higher literacy rate (>Grade 12) disagreed more strongly than those with a lower literacy rate (= \leq Grade 12) that a permit was needed to catch fish or that a permit will help limit the number of fish being caught. Further analysis on education showed that a significantly higher proportion of fisherfolk with a Grade 10 education and above, compared to those with Grade 9 and below, were more in favour of only catching a certain number, but did not believe that a permit would help. They were also more in favour of fishing without restrictions, than fisherfolk with a Grade 9 educational level.

Table 5.4.4. Results of χ^2 tests for three socio-economic factors associated with attitudes to fishing practices of fisherfolk. Significance values shown; NS= not significant, * p <0.05, ** p <0.01.

Statement	Mean age in years - <38 versus >38 years old	Mean visitation length in years <10 years versus >10 years	Education (Grades) <Gr 12 versus = \geq Gr 12	Education (Grades) <Gr9 versus = \geq Gr10
Fishermen need a permit to catch fish at WNR	NS	5.9 *	4.4 *	NS
Only those large enough should be caught	NS	NS	NS	NS
Only a certain number should be caught	5.8 *	NS	NS	3.8 *
If we catch a certain number, there will always be enough	NS	NS	NS	NS
A permit will help the number being caught	NS	NS	5.9 *	6.9 **
Fishermen should be allowed to fish without restrictions	NS	NS	NS	3.7 *
Fishermen need to be fully consulted about upgrading WNR	NS	4.4 *	NS	NS

3.2.3.2. Teachers

Table 5.4.5 shows that 52% of teachers currently use the WNR to teach six subjects covering five Learning Areas. In the future, teachers who teach in the Arts and Culture Learning Areas (4%) intend to include Language and Literature in teaching about WNR. In the future, Language, History, Science and Mathematics teachers intend to include the three learning areas of Mathematics, Human and Social Sciences (HSS), and Science and Technology in teaching about WNR. Almost half the teachers surveyed who did not use WNR in any subject at present, also perceived that they would use WNR in the aforementioned three learning areas in the future. All teachers indicated that WNR could possibly be used in all learning areas should sites in WNR be identified for these and proper resources are provided to cover all learning areas. They indicated that their future use would require educational resource in each learning area primarily in the form of information packs and worksheets (Table 5.4.5). To develop these resources, 52% indicated that teachers would need to develop these resources with specialists, 40% wanted specialist to develop the resources, and 8% felt that they could develop the educational resources themselves. When asked how many learners they would take to WNR on average, teachers indicated that 16.8 (± 7.4) (range 5-35) per teacher would, from their experience, be the ideal number.

Table 5.4.5. Percentage (%) responses of teachers to their current subject use in WNR, perceived future use and resource requirements.

Current usage			Perceived future usage	
Subjects	Learning Area	Percentage response	Additional Learning Area/s	Resource requirements
Art	Arts and Culture	2	Language and Literature	Information packs, worksheets, videos
English	Language and Literature	2	Human and Social Science (HSS); Science and Technology	Information packs, worksheets, charts as in class
History	Human and Social Science	2	HSS; Science and Technology	Information packs, worksheets
Language studies	Language and Literature	10	HSS; Science and Technology	Information packs, worksheets, guides
Music	Arts and Culture	2	Language and Literature	Musical instruments, worksheets
Science	Science and Technology	20	HSS; Mathematics	Information packs, worksheets, research information on educational audits, videos, charts.
Mathematics	Mathematics and Numeracy	14	HSS; Science and Technology	Information packs, worksheets
None		48	Mathematics; HSS; Science and Technology	Information packs, worksheets, videos

3.2.3.3. Secondary and primary school pupils

All secondary and primary pupils could identify a subject in which they could be taught in WNR (Table 5.4.6). Secondary pupils identified seven subjects covering the four Learning Areas of Arts and Culture, Human and Social Sciences, Economics and Management Sciences and Science and Technology. Primary school pupils identified three subjects covering the two Learning Areas of Human and Social Science and Science and Technology. The majority of secondary pupils (60%) preferred the WNR to be used for learning Biology while the majority in primary school pupils (78%) preferred it for General Science. There was general consensus during discussions after the interviews with primary and secondary pupils that they enjoyed learning in the natural environment. Secondary and primary pupils preferred similar projects relating to the history and ecology of WNR and pollution and alien plant studies. However, 4% of secondary pupils also wanted to use medicinal plants in the subject of Home economics. In both groups, the trend regarding resource requirements were similar. The majority in both groups preferred resources to be held as information in local libraries, about one third (36%) of secondary pupils and about one quarter (23%) of primary pupils preferred guides to direct them in WNR and 14% secondary and 16% primary pupils preferred that the information should be available in books.

Table 5.4.6. Percentage (%) response to subject, project and resource preferences of secondary and primary school pupils to environmental education (EE) activities in the WNR.

<i>Subject preferences</i>			<i>Project preferences with resource requirements</i>		
Subjects	Learning Area	% response	Projects	Resource requirements	Percentage response
Secondary school pupils					
Art and Music	Arts and Culture	8	The history of WNR	Library information	20
History, Geography	Human and Social Sciences	18	EE; Small business	Books	10
Home economics	Economics and Management Science	4	Use of medicinal plants	Guides	36
Physical Science	Science and Technology	10	Soil chemistry	Books	4
Biology	Science and Technology	60	EE; Plant and Animal Ecology; Pollution and alien plant studies	Library information	30
Primary school pupils					
History and Geography	Human and Social Sciences	22	History of WNR; Pollution and alien plant studies	Library information; Guides	61
General Science	Science and Technology,	78	EE; Plant and Animal Ecology; Pollution and alien plant studies	Books held in local libraries	23
					16

3.2.4. *Factors that influenced visitation to WNR*

Factors that influenced each user group's use of WNR were related firstly to facilities desired by each group, secondly to drawbacks outside WNR which made visiting difficult, and thirdly to drawbacks inside WNR which acted as barriers to users. While a detailed analysis is provided in Appendix 16a, results are briefly summarized below. Fisherfolk ranked parking as the primary facility they desired, which was also ranked significantly higher ($p=0.03$, $d.f.=8$) than the other facilities. The majority of teachers (75%) and secondary school pupils (94%) ranked having an enviro/information centre as the primary facility. Teachers ranked this significantly more strongly ($p=0.04$, $d.f.=8$) than other facilities such as taps, while secondary school pupils ranked an enviro/information centre significantly more strongly ($p=0.001$, $d.f.=7$) than a birdhide, for example. Although 40% of pupils at primary schools also ranked an enviro/ information centre as their first preference, they also supported a wider range of facilities as a group. Fisherfolk ranked a picnic area as their second and toilets as their third most desired facility. Teachers and secondary school pupils ranked information boards as their second most desired facility. Teachers ranked proper paths and trails third and secondary pupils ranked toilets as their third most desired facility. Primary school pupils respectively ranked toilets and taps as their second and third most desired facilities.

The majority of fisherfolk (78%) appeared not to have any difficulties outside WNR which made it difficult for them to visit. The primary drawback outside WNR which made it difficult for the majority of teachers (75%), secondary (86%) and primary (53%) school pupils was the lack of information. Teachers, primary and secondary pupils ranked the lack of transport as their second most difficult drawback. It is interesting to note that 20% of the secondary pupils thought that WNR was not relevant in the curriculum. Analyses of within group differences for each group for difficulties outside WNR did not yield significant differences relative to "the lack of information".

Results for drawbacks inside the WNR showed that the majority of adult users (fisherfolk = 92% of respondents; teachers = 75% of respondents) ranked safety as their primary drawback. Secondary drawbacks for fisherfolk were the lack of patrols and for teachers it was the lack of paths and trails. Secondary school pupils appeared divided and ranked the primary to tertiary drawbacks inside WNR as the lack of guides, followed by the thick bush and pollution. Primary school pupils (66%) ranked the pollution, the thick bush and the lack of paths/ trails as their first to third choice, which needed to be improved inside WNR, in order for them to use the area. What was interesting was that a substantially higher percentage of primary pupils (66%) were more concerned about pollution acting as a drawback inside WNR, than by safety. An analysis of with-in group differences for each group for difficulties inside WNR

Responses as to “how information should be developed” (Fig. 5.4.1) revealed that the majority of fisherfolk (86%) preferred information that reflected mostly pictures accompanied by a few facts. Teachers were divided in that 50% of teachers preferred detailed facts with pictures, while 20% of teachers preferred mostly pictures with a few facts and 30% preferred information in both the format of stories with pictures. Statistical comparisons of teacher level (junior primary (Grade 1-3) versus senior primary/senior teachers (Grades 4-7) ($F=0.198$, $df=1$, $p=0.6$) and Science subject affinity (science teachers versus non-science teachers) ($F=0.0062$, $df=1$, $p=0.9$) revealed that these factors did not significantly influence teachers responses towards the selection of a particular format of information. The majority (60%) of secondary pupils preferred detailed facts with pictures. About two thirds (64%) of the primary school pupils preferred their information in the format of stories with pictures.

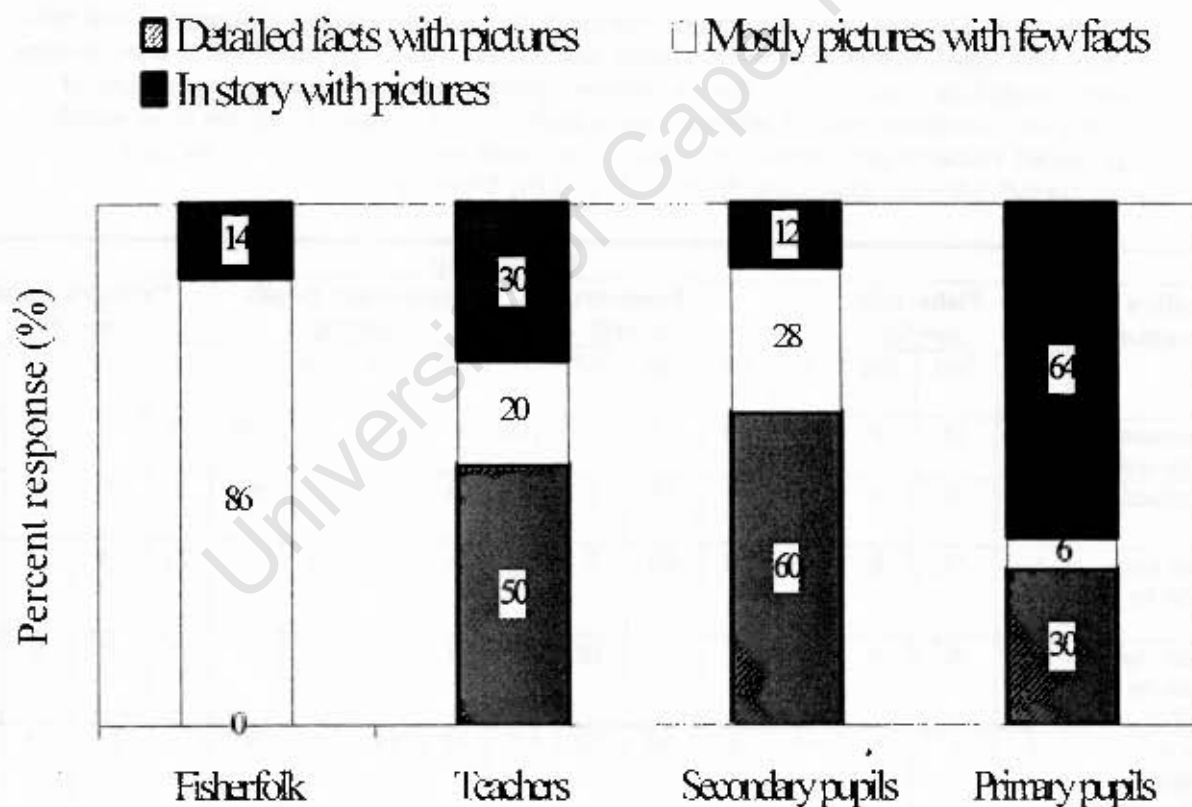


Figure 5.4.1. Percentage responses as to how information that is to be developed, is to be presented.

When asked “what type of visitation programme would make your visit enjoyable?” 54% of fisherfolk and 45% of teachers ranked “Guided tours paid for by the local authority” as their

3.3.2. Land-use

Using WNR as a multi-purpose nature reserve where non-consumptive uses such as relaxation could take place was ranked first by just over half of the fisherfolk (54%) and primary school pupils (51%), and by almost three quarter (72%) of the secondary school pupils (Table 5.4.9). Half (50%) of the teachers ranked keeping WNR exclusively for plants and animals as their first choice, which was not significantly higher than the 40% teachers who also wanted it to remain a multi-purpose nature reserve. All user groups ranked ecotourism as their second choice, which in all groups was not found to be significantly different to using WNR as a “multi-purpose nature reserve”.

Table 5.4.9. The rank order of land use preference for the four types of user groups. Values are expressed as a percentage and rounded up. Significant differences between preferences within each group calculated using the Wilcoxon-matched pairs test and in each case are compared with the most widely preferred land use i.e. “using WNR as a multi-purpose nature reserve”. NS= not significant, * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Land use preference	User Group																Overall %
	Fisherfolk (n=50)				Teachers (n=40)				Secondary pupils (n=50)				Primary pupils (n=100)				
	1 st	2nd	3rd	P	1st	2nd	3rd	P	1st	2nd	3rd	P	1st	2nd	3rd	P	
Keep as a nature reserve for plants and animals	46	0	0	NS	50	15	18	NS	26	4	2	NS	44	3	0	NS	17
Multi-use nature reserve (non-consumptive e.g. relaxation)	54	48	2	—	40	33	10	—	72	8	0	—	51	9	2	—	26
Eco-tourism	0	52	42	NS	10	47	40	NS	0	70	12	NS	0	52	15	NS	27
Housing	0	0	0	** *	0	0	0	***	0	0	0	***	0	1	1	**	0
Playpark	0	0	50	**	0	0	20	*	0	16	26	NS	5	33	12	NS	14
Caravan park	0	0	6	**	0	0	0	***	0	2	2	*	0	0	2	**	1
Camping area	0	0	0	** *	0	5	12	*	2	0	58	NS	0	2	68	NS	15
TOTAL																	100

When asked “other than your use, what other use could WNR be put to?” the majority of fisherfolk (94%) did not want any other developments (Fig.5.4.2). Forty percent teachers and 80% secondary pupils wanted the area to be used for tourism. Seventy percent primary school pupils wanted the area to be used as a camp site, but one that only accommodates scholars who use the area for educational camps.

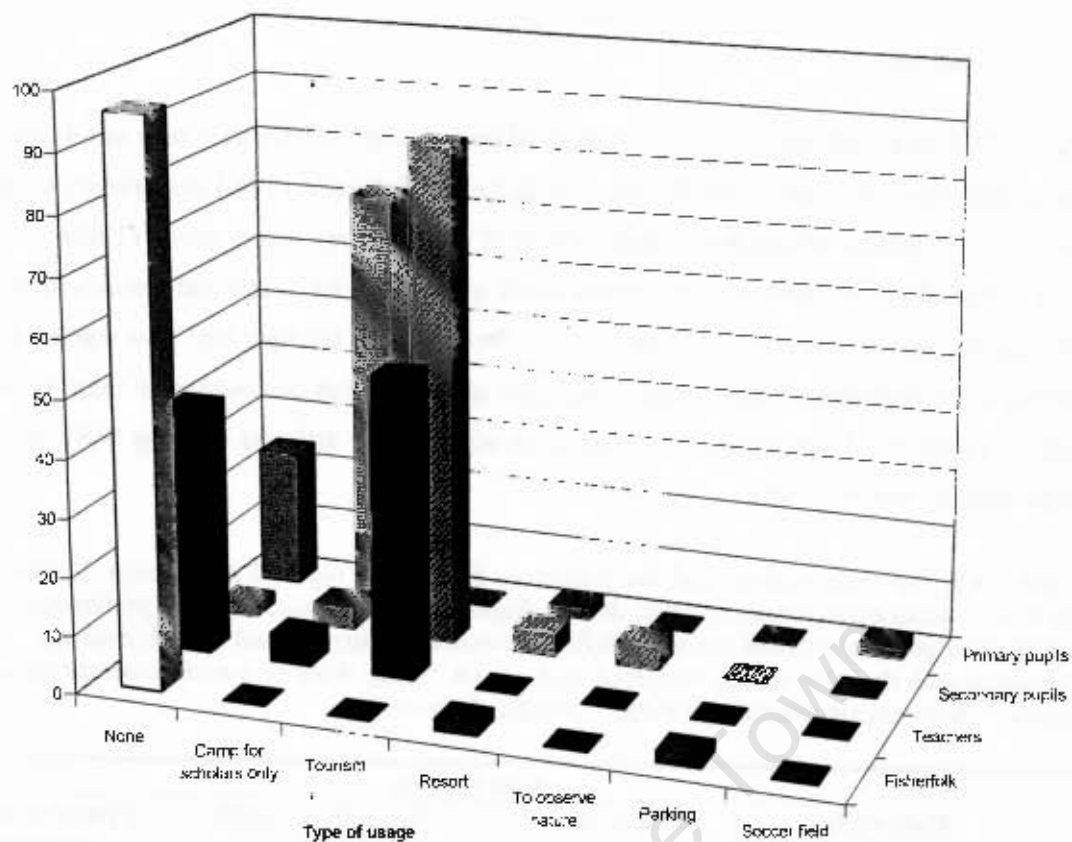


Figure 5.4.2: Percentage response to the question "Other than your use, what other use should WNR be put to?"

Five socio-economic factors were selected (i.e. Mean age, Education level, Mean visitation length, residency and gender) to determine which factors influenced users' preference to consumptive or non-consumptive use. If a respondent selected a non-consumptive or consumptive benefit as one of their first three priority choices it was taken as a positive preference. If a respondent selected a non-consumptive or consumptive benefit as their fourth or higher choice, it was considered a negative preference. Of the five selected factors, only residency for fisherfolk and residency and gender for primary school pupils significantly influenced users' preference towards using WNR in a consumptive or non-consumptive manner (see Appendix 17a for details). Fisherfolk who resided in Mitchell's Plain preferred to use WNR in a more consumptive manner than those who lived outside of Mitchell's Plain. Fifty percent of the fisherfolk wanted some of the area to be developed with a playpark and 6% wanted a caravan park, both to accommodate their families when they accompanied them. The majority of the primary school pupils who lived <1km from WNR (100%), as well the majority who lived >1km (82%), preferred a section of WNR to be used consumptively for a playpark. The majority of male and female primary school pupils wanted WNR to be used consumptively for educational camps.

Table 5.4.11. The rank order of perceived threats to WNR, for the four types of user groups. Values are expressed as a percentage and rounded up. Significant differences between perceived threats within each group calculated using the Wilcoxon-matched pairs test and in each case are compared with the most widely perceived threat i.e. "WNR being threatened by crime". NS= not significant, * $p<0.05$, ** $p<0.01$.

	User Group																
Perceived threat	Fisherfolk (n=50)				Teachers (n=40)				Secondary pupils (n=50)				Primary pupils (n=100)				Over-all %
	1st	2nd	3rd	P	1st	2 nd	3rd	P	1st	2nd	3rd	P	1st	2nd	3rd	P	
Thick bushes	12	28	12	NS	38	13	10	NS	38	20	2	NS	52	10	0	NS	20
Housing development	6	4	4	*	13	5	10	NS	8	16	4	NS	0	8	9	*	7
Rubbish dumping	14	26	40	NS	33	43	15	NS	42	44	14	*	26	52	18	NS	31
Fires	2	0	0	**	5	13	8	NS	2	16	20	NS	1	11	13	*	8
Pollution of the sea	12	24	10	NS	0	3	3	*	0	0	2	NS	1	3	1	*	4
Crime (safety)	54	12	20	---	3	18	23	---	0	2	16	---	4	12	51	---	19
Lack of information	0	2	10	*	5	3	23	NS	10	0	42	NS	16	3	2	NS	9
Pollution of the land	0	4	4	**	5	5	10	NS	0	2	0	NS	0	1	6	*	3
TOTAL																	100

For teachers, age and educational level were the two factors significantly related to whether the thick bush was perceived as a threat while gender was related to whether crime was perceived as a threat. Teachers older than 35 years and those who had completed Grade 10 plus 3 years felt more threatened than their younger and less educated counterparts. A higher proportion of female than male teachers perceived crime as a threat.

Factors significantly related to whether secondary pupils perceived the three threats were age, education level and gender. A higher proportion (81% of respondents) of secondary pupils over the age of 15 years felt that the thick bush was a threat while the same proportion over the age of 15 years felt that rubbish dumping was a threat. Secondary pupils in Grade 11 felt significantly less threatened by crime than secondary pupils in Grade 10. A higher proportion of males (92%) than females (68%) in secondary school did not feel that crime was a threat. Although the majority of primary school pupils (84%) felt that rubbish dumping was a threat, a higher proportion of those residing less than 1 km from WNR (77%) perceived rubbish dumping as a threat compared to those living more than 1 km from WNR, who felt that rubbish dumping was not a threat.

3.4 Perceptions

3.4.1 *Perceived value of WNR*

Forty two percent of fisherfolk ranked the primary value of WNR as being the only nature reserve in Mitchells Plain (Table 5.4.10). The second greatest value was in it being a sanctuary for birds, and thirdly, an important recreation area. Teachers (53%), secondary (52%) and primary school pupils (45%) ranked the primary value of WNR as "it is part of our history". Teachers further believed that the second and third most important value of WNR was for it being our only nature reserve and being a heritage for future generations, respectively. Secondary pupils ranked its secondary and tertiary value as a bird sanctuary and as an area for tourism, respectively. Primary school pupils believed that its secondary and tertiary value lay in its plant diversity and it being a place for wild animals, respectively. The value that drew the most overall support (15 %) across all user groups was that it forms part of the history of Mitchells Plain. Fisherfolk felt significantly more strongly about WNR as being the only nature reserve in Mitchells Plain than WNR "being part of our history". There was no significant difference between WNR as being "part of our history" and WNR being "a heritage for future generations", across all user groups.

3.4.2 *Perceived threats*

The data shows that the four user groups perceived the main threats to involve crime, rubbish dumping, the thick bush and the lack of information as the main threats to WNR (Table 5.4.11). Crime was ranked first by the fisherfolk (54% of respondents) and secondary pupils ranked rubbish dumping first (42% of respondents) (Table 5.4.11). Teachers (38% of respondents) and primary school pupils (52% of respondents) ranked the thick bush as their primary concern. Fisherfolk went on to rank the thick bush and rubbish dumping as the second and third greatest threats to WNR. Teachers went on to rank rubbish dumping and crime as the second and third greatest threats to WNR. Secondary pupils went on to rank the thick bush and lack of information as the second and third greatest threats to WNR. Primary school pupils went on to rank rubbish dumping and crime as the second and third greatest threats to WNR. Fisherfolk perceived crime of similar importance as sea pollution, and significantly more important than land pollution and the lack of information. Except for sea pollution teachers felt that crime was not significantly more important than other threats. Secondary pupils felt that crime was significantly less important than rubbish dumping. Primary school pupils felt that crime was significantly more important than fires, sea and land pollution and housing development.

Table 5.4.10. The rank order of the perceived value of WNR, for the four types of user groups. Values are expressed as a percentage and rounded up. Significant differences between preferences within each group calculated using the Wilcoxon-matched pairs test and in each case are compared with the most widely perceived value i.e. "WNR is part of our history". NS= not significant, * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Perceived value of WNR	User Group																Over-all %
	Fisherfolk (n=50)				Teachers (n=40)				Secondary pupils (n=50)				Primary pupils (n=100)				
	1st	2nd	3rd	P	1st	2 nd	3rd	P	1st	2nd	3rd	P	1st	2nd	3rd	P	
Part of our history	16	0	0	—	53	5	3	—	52	2	0	—	45	2	0	—	15
Birds	24	40	0	*	0	18	0	NS	12	24	0	***	28	6	2	NS	11
Lots of plants	0	6	8	NS	3	15	13	NS	8	12	8	NS	13	39	1	NS	12
Place for wild animals	0	2	4	NS	0	0	3	***	6	6	2	NS	3	8	17	NS	5
Insects	0	0	0	***	0	0	13	NS	8	14	4	NS	2	4	11	NS	5
Buffer zone	0	2	0	***	3	5	5	NS	8	8	8	NS	4	7	12	NS	6
Our only nature reserve	42	10	8	**	13	28	8	NS	2	8	8	NS	1	17	7	NS	14
Heritage for future generations	2	8	18	NS	10	13	23	NS	0	6	6	NS	0	5	15	NS	9
Scrambling	0	0	0	***	0	3	3	***	0	0	0	***	1	2	6	** *	2
Bicycle riding	0	0	0	***	0	0	0	***	0	2	2	***	1	2	2	** *	1
Education	0	10	2	***	13	5	13	**	0	4	10	NS	0	5	12	NS	5
Recreation	16	0	44	NS	5	5	8	**	0	8	6	NS	0	0	3	**	7
Pick plants	0	0	0	***	0	0	5	NS	0	0	2	**	0	0	3	**	1
Pick herbs	0	0	0	***	0	0	0	***	0	0	2	**	0	1	1	**	0
Firewood	0	12	0	***	0	3	0	***	0	2	4	**	0	0	1	**	2
Jobs	0	2	0	***	3	0	8	NS	0	0	8	**	1	1	4	NS	2
Tourism	0	0	16	***	0	3	0	**	4	4	30	NS	1	1	3	NS	5
TOTAL																	100

Further analysis was conducted to test the relationships between socio-economic variables and perceptions of the three greatest factors (thick bush, rubbish dumping and crime), which threaten the conservation of the area. While a summarized account is provided below, detailed results are provided in Appendix 18a. For fisherfolk, none of the selected factors, except residency in the neighbouring community of Mitchells Plain compared to further away were significantly related to whether a respondent felt threatened by the thick bush. A higher proportion of fisherfolk (84% of respondents) living inside compared to those living outside Mitchells Plain felt more threatened by the thick bush.

Table 5.4.11. The rank order of perceived threats to WNR, for the four types of user groups. Values are expressed as a percentage and rounded up. Significant differences between perceived threats within each group calculated using the Wilcoxon-matched pairs test and in each case are compared with the most widely perceived threat i.e. "WNR being threatened by crime". NS= not significant, * $p<0.05$, ** $p<0.01$.

Perceived threat	User Group																Over-all %
	Fisherfolk (n=50)				Teachers (n=40)				Secondary pupils (n=50)				Primary pupils (n=100)				
	1st	2nd	3rd	P	1st	2 nd	3rd	P	1st	2nd	3rd	P	1st	2nd	3rd	P	
Thick bushes	12	28	12	NS	38	13	10	NS	38	20	2	NS	52	10	0	NS	20
Housing development	6	4	4	*	13	5	10	NS	8	16	4	NS	0	8	9	*	7
Rubbish dumping	14	26	40	NS	33	43	15	NS	42	44	14	*	26	52	18	NS	31
Fires	2	0	0	**	5	13	8	NS	2	16	20	NS	1	11	13	*	8
Pollution of the sea	12	24	10	NS	0	3	3	*	0	0	2	NS	1	3	1	*	4
Crime (safety)	54	12	20	---	3	18	23	---	0	2	16	---	4	12	51	---	19
Lack of information	0	2	10	*	5	3	23	NS	10	0	42	NS	16	3	2	NS	9
Pollution of the land	0	4	4	**	5	5	10	NS	0	2	0	NS	0	1	6	*	3
TOTAL																	100

For teachers, age and educational level were the two factors significantly related to whether the thick bush was perceived as a threat while gender was related to whether crime was perceived as a threat. Teachers older than 35 years and those who had completed Grade 10 plus 3 years felt more threatened than their younger and less educated counterparts. A higher proportion of female than male teachers perceived crime as a threat.

Factors significantly related to whether secondary pupils perceived the three threats were age, education level and gender. A higher proportion (81% of respondents) of secondary pupils over the age of 15 years felt that the thick bush was a threat while the same proportion over the age of 15 years felt that rubbish dumping was a threat. Secondary pupils in Grade 11 felt significantly less threatened by crime than secondary pupils in Grade 10. A higher proportion of males (92%) than females (68%) in secondary school did not feel that crime was a threat. Although the majority of primary school pupils (84%) felt that rubbish dumping was a threat, a higher proportion of those residing less than 1 km from WNR (77%) perceived rubbish dumping as a threat compared to those living more than 1 km from WNR, who felt that rubbish dumping was not a threat.

3.5 Understanding of the term “conservation” and knowledge of the flora and fauna

3.5.1. The term “conservation”

Responses to the open-ended question “what do you understand by the term conservation?” yielded seven categories of responses (Fig. 5.4.3). The majority of responses for all user groups combined were in the “preserve WNR”, followed by “protect WNR for future generations” and don’t know” categories, respectively. When taking an average of all user groups together, about one third (33%) of respondents understood conservation as preserving WNR and 23% did not know.

Responses of fisherfolk was varied with 22% understanding the term conservation as “protecting WNR for future generations”, 26% as “preserving it” and 30% did not know. About one third (32%) of teachers thought it meant protection, while just over one third (38%) thought that conservation meant to “preserve WNR”. A quarter (25%) said that it meant “to conserve (WNR) as a heritage for future generations”. The majority of secondary pupils (42%) indicated that they did not know, whilst 22% thought that it meant “to protect it for future generations” and 22% to “preserve it”. The majority of primary school pupils thought that conservation meant “protection” (19%) or “preserving WNR” (45%). When just considering educational users (teachers and pupils), over half (56%) did not know, and about one third (36%) understood it as preserving WNR.

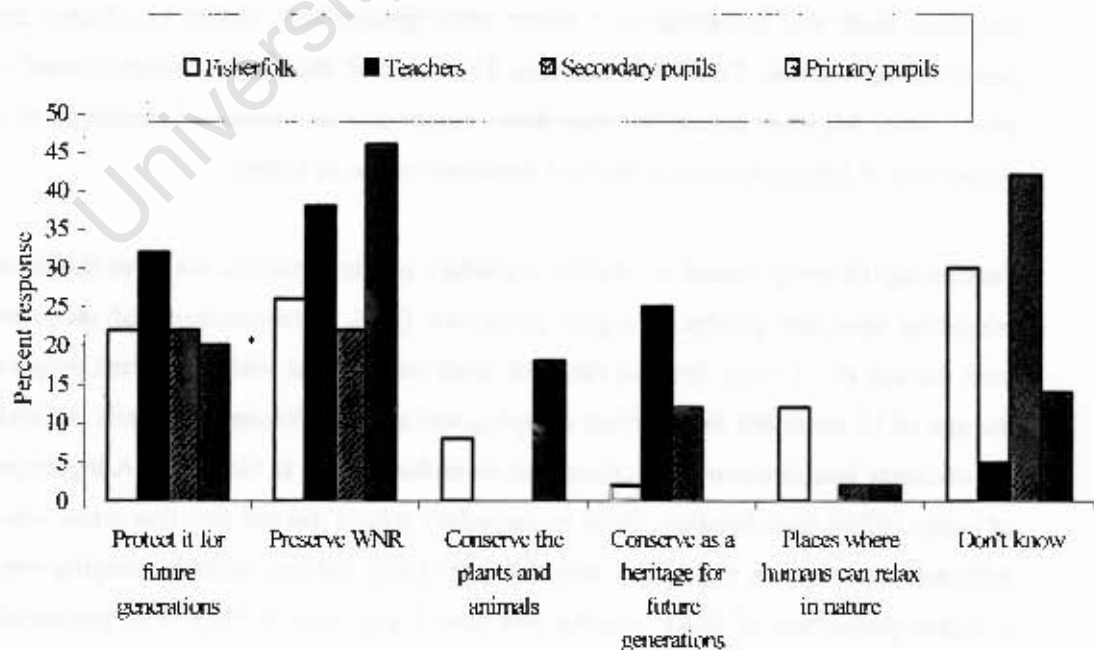


Figure 5.4.3. Percentage responses for each user group to the question “what do you understand by the term conservation?”

3.5.2. Knowledge of the flora and fauna

In correctly identifying flora, respondents used a total of 28 names to describe plants in WNR (Fig.5.4.4). At the level of veld type, 34% fisherfolk, 80% teachers, 46% secondary and 17% primary pupils correctly identified the flora as fynbos. At family level, only the Araceae, Asteraceae and Rosaceae families were correctly identified by 20% or less of the adult fisherfolk and teacher users.

Forty percent of the secondary pupils and 17% of the primary pupils correctly identified the same families. All responses at genus level were correctly identified as common names with no user group identifying plants correct to the species level. Twenty five different common names were used by respondents. The group where the highest proportion of respondents correctly identified the flora at genus level were primary school pupils where 66% correctly identified plants occurring in WNR.

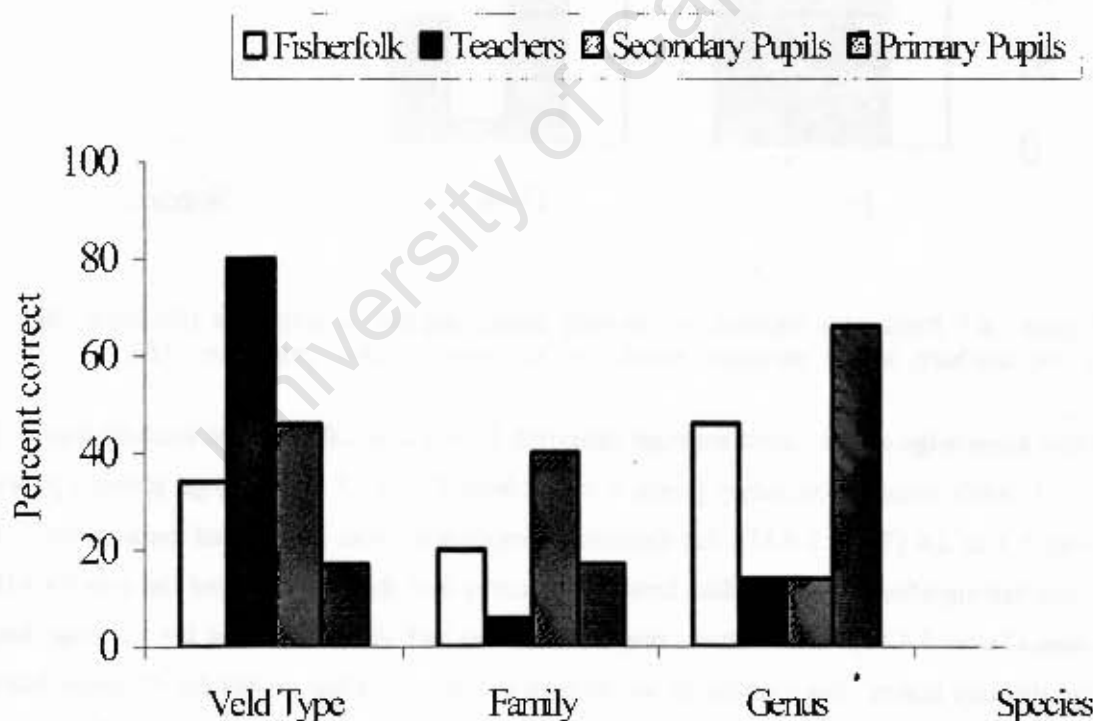


Figure 5.4.4. Percentage respondents correctly classifying the flora by taxa (for fisherfolk, $n=11$; teachers, $n=28$; Secondary pupils, $n=43$; primary school pupils, $n=65$).

In identifying the fauna, respondents used a total of 25 names to describe the animals in WNR (Fig. 5.4.5). Four families of taxa were correctly identified. There were Aves, Artiodactyla, Insectivora and Rodentia. The highest proportion of responses for teachers (57%), secondary (94%) and primary school pupils (70%) occurred at the family level. Fifty two percent of fisherfolk correctly identified animals at the genus level. None of the respondents could identify animals at the species level.

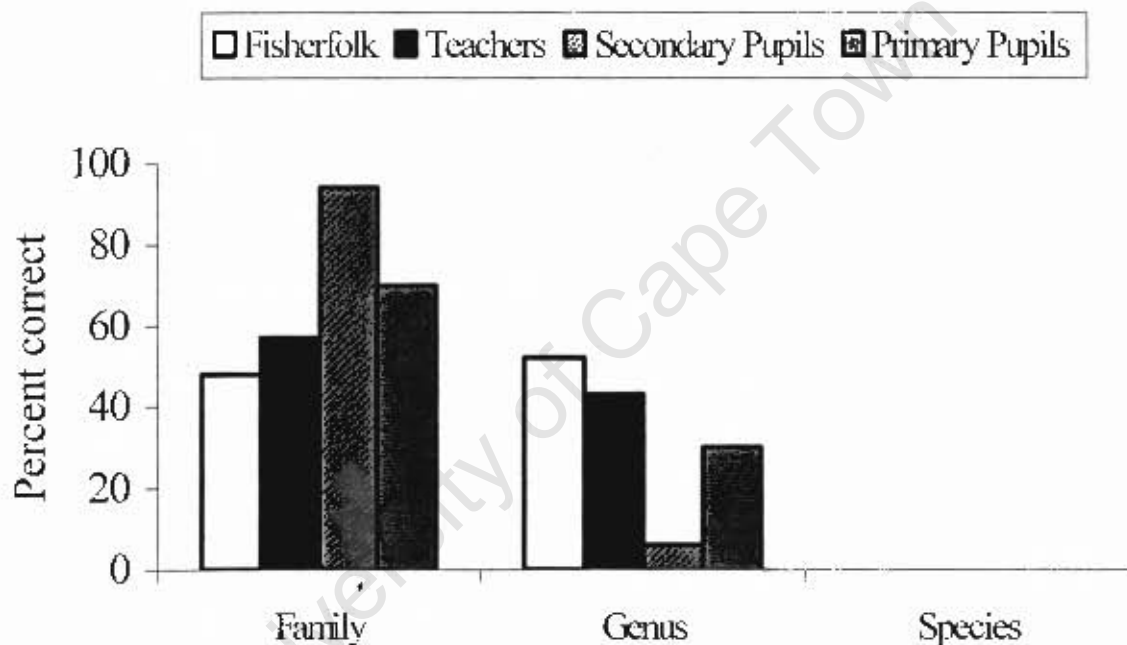


Figure 5.4.5. Percentage respondents correctly classifying the fauna by taxa (for fisherfolk, $n=19$; teachers, $n=29$; secondary pupils, $n=42$; primary school pupils, $n=81$).

Flora knowledge scores varied amongst fisherfolk from 1.2 to 2.0; amongst teachers from 1.1 to 1.5; while amongst secondary pupils it varied from 1.4 to 1.7 and amongst primary pupils from 1.1 to 2.6 (Table 5.4.12). For fisherfolk, respondents who had visited the area for >10 years had significantly higher flora knowledge scores than those who visited the area for <10 years (Table 5.4.12). For teachers, respondents who had visited the area for >2 years had significantly higher flora knowledge scores than teachers who had visited for <2 years. Male teachers had significantly higher flora knowledge scores than female teachers. Secondary school pupils who were in Grade 11 had significantly higher floral knowledge scores than those in Grade 10. For primary school pupils, respondents with higher floral knowledge scores were older, in Grade 7 than in Grade 6, had visited >1 year compared to those who visited <1 year, lived <1km from WNR than those who lived >1km from WNR, and who were female rather than male (Table 5.4.12).

3.5 Understanding of the term “conservation” and knowledge of the flora and fauna

3.5.1. The term “conservation”

Responses to the open-ended question “what do you understand by the term conservation?” yielded seven categories of responses (Fig. 5.4.3). The majority of responses for all user groups combined were in the “preserve WNR”, followed by “protect WNR for future generations” and don’t know” categories, respectively. When taking an average of all user groups together, about one third (33%) of respondents understood conservation as preserving WNR and 23% did not know.

Responses of fisherfolk was varied with 22% understanding the term conservation as “protecting WNR for future generations”, 26% as “preserving it” and 30% did not know. About one third (32%) of teachers thought it meant protection, while just over one third (38%) thought that conservation meant to “preserve WNR”. A quarter (25%) said that it meant “to conserve (WNR) as a heritage for future generations”. The majority of secondary pupils (42%) indicated that they did not know, whilst 22% thought that it meant “to protect it for future generations” and 22% to “preserve it”. The majority of primary school pupils thought that conservation meant “protection” (19%) or “preserving WNR” (45%). When just considering educational users (teachers and pupils), over half (56%) did not know, and about one third (36%) understood it as preserving WNR.

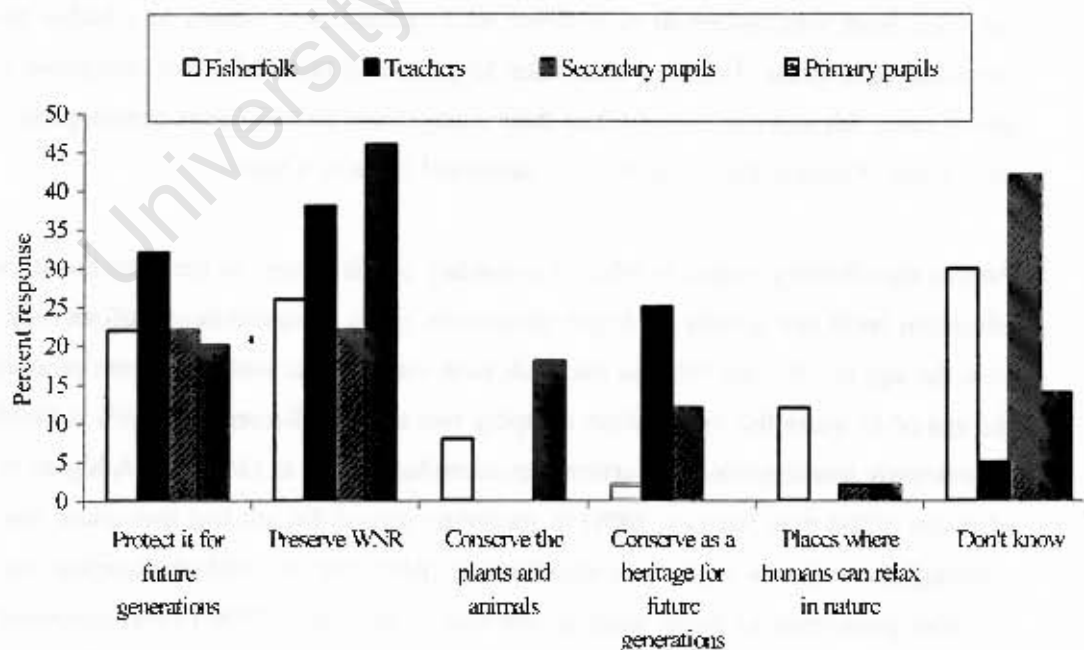


Figure 5.4.3. Percentage responses for each user group to the question “what do you understand by the term conservation?”

Table 5.4.11. The rank order of perceived threats to WNR, for the four types of user groups. Values are expressed as a percentage and rounded up. Significant differences between perceived threats within each group calculated using the Wilcoxon-matched pairs test and in each case are compared with the most widely perceived threat i.e. "WNR being threatened by crime". NS= not significant, * $p<0.05$, ** $p<0.01$.

Perceived threat	User Group																Over-all %
	Fisherfolk (n=50)				Teachers (n=40)				Secondary pupils (n=50)				Primary pupils (n=100)				
	1st	2nd	3rd	P	1st	2 nd	3rd	P	1st	2nd	3rd	P	1st	2nd	3rd	P	
Thick bushes	12	28	12	NS	38	13	10	NS	38	20	2	NS	52	10	0	NS	20
Housing development	6	4	4	*	13	5	10	NS	8	16	4	NS	0	8	9	*	7
Rubbish dumping	14	26	40	NS	33	43	15	NS	42	44	14	*	26	52	18	NS	31
Fires	2	0	0	**	5	13	8	NS	2	16	20	NS	1	11	13	*	8
Pollution of the sea	12	24	10	NS	0	3	3	*	0	0	2	NS	1	3	1	*	4
Crime (safety)	54	12	20	---	3	18	23	---	0	2	16	---	4	12	51	---	19
Lack of information	0	2	10	*	5	3	23	NS	10	0	42	NS	16	3	2	NS	9
Pollution of the land	0	4	4	**	5	5	10	NS	0	2	0	NS	0	1	6	*	3
TOTAL																	100

For teachers, age and educational level were the two factors significantly related to whether the thick bush was perceived as a threat while gender was related to whether crime was perceived as a threat. Teachers older than 35 years and those who had completed Grade 10 plus 3 years felt more threatened than their younger and less educated counterparts. A higher proportion of female than male teachers perceived crime as a threat.

Factors significantly related to whether secondary pupils perceived the three threats were age, education level and gender. A higher proportion (81% of respondents) of secondary pupils over the age of 15 years felt that the thick bush was a threat while the same proportion over the age of 15 years felt that rubbish dumping was a threat. Secondary pupils in Grade 11 felt significantly less threatened by crime than secondary pupils in Grade 10. A higher proportion of males (92%) than females (68%) in secondary school did not feel that crime was a threat. Although the majority of primary school pupils (84%) felt that rubbish dumping was a threat, a higher proportion of those residing less than 1 km from WNR (77%) perceived rubbish dumping as a threat compared to those living more than 1 km from WNR, who felt that rubbish dumping was not a threat.

Table 5.4.12. Relationship between socio-economic characteristics of the four user groups and aggregate flora knowledge, calculated as the sum of the mean family, genus and species scores. Mean knowledge score shown. NS = not significant, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

User group	Socio-economic factors											
	Mean age (years)		Educational level (Grade)		Years visiting Wolfgat		Residency (In / out of Mitchells Plain); distance from WNR			Gender		
Fisherfolk												
Category	<38	>38	Prim.	Sec.	<10	>10	In	Out of	Male	Female		
No. respondents	4	7	6	5	2	9	5	6	11	0		
Mean Knowledge score	1.5	1.3	1.2	1.6	2.0	1.3	1.4	1.2	1.4	0.0		
Standard deviation	1.0	0.5	0.4	0.9	1.4	0.5	0.9	0.4	0.7	0.0		
F	42.		4.8		8.4		4.8			0.0		
P	NS		NS		*		NS			NS		
Teachers												
Category	<35	>35	Gr12+3	Gr12+4	<2	>2	In	Out	<1 km	>1 km	Male	Female
No. respondents	15	13	18	10	21	7	16	12	23	5	14	14
Mean Knowledge score	1.2	1.4	1.3	1.3	1.1	1.4	1.3	1.3	1.3	1.4	1.5	1.1
Standard deviation	0.4	0.7	0.6	0.5	0.3	0.6	0.6	0.5	0.5	0.5	0.7	0.3
F	2.5		1.4		4.2		1.6		1.0		5.9	
P	NS		NS		*		NS		NS		**	
Secondary pupils												
Category	<15	>15	Gr10	Gr11	<1	>1	In	Out of	Male	Female		
No. respondents	5	38	23	20	37	6	43	0	21	22		
Mean Knowledge score	1.4	1.5	1.5	1.7	1.6	1.7	1.6	0	1.5	1.6		
Standard deviation	0.5	0.6	0.5	0.9	.07	1.0	0.7	0.0	0.7	0.3		
F	1.4		2.9		2.2		0.0			1.2		
P	NS		*		NS		NS			NS		
Primary pupils												
Category	<13	>13	Gr6	Gr7	<1	>1	<1 km	>1 km	Male	Female		
No. respondents	36	29	43	22	47	18	31	34	31	34		
Mean Knowledge score	1.6	1.8	1.2	2.6	1.5	1.8	2.3	1.1	1.4	1.9		
Standard deviation	0.9	1.4	0.5	1.4	0.8	1.2	1.3	0.4	0.7	1.4		
F	2.3		7.4		2.5		12.8			4.3		
P	*		***		*		***			***		

Fauna knowledge scores amongst fisherfolk varied from 1.3 to 2.3; amongst teachers from 1.8 to 2.6; amongst secondary pupils varied from 1.4 to 1.7 and amongst primary pupils from 1.5 to 3.1 (Table 5.4.13).

secondary education also had a slightly higher knowledge score than teachers who had Grade 12 plus 4 years education, although it was not significantly higher.

Fauna knowledge scores for school-going user groups show that higher animal knowledge scores were significantly associated with educational level and with living distance (residency) from WNR. Secondary pupils who were in Grade 11 had significantly higher fauna knowledge scores than pupils in Grade 10 (Table 5.4.13). Primary school pupils who lived <1 km away from the WNR had higher fauna knowledge scores than those who lived >1 km away from WNR.

4. Discussion

4.1 Usage

The findings of this study show there is great variation of usage patterns amongst user groups. Fisherfolk had been using WNR for the past ten years prior to this study while educational users had only used WNR for the past two years. On a monthly basis, WNR experience the highest use by fisherfolk, followed by primary school pupils, teachers and secondary school pupils. These findings indicates that fisherfolk have a more crucial role to play than previously thought (Khan, 1994) in participating in the ongoing utilization management of WNR, as they would be most familiar with conditions in and changes that have occurred in WNR. Findings show that fisherfolk display a seasonal usage pattern in that the majority of fisherfolk concentrate their use over the spring and summer months of November to February. The seasonality of resource use by fisherfolk in this study is consistent with findings of McGregor (1995) for fishing in Zimbabwe's communal areas and Burger et al. (1998) at the Savannah River site in South Carolina. However, it is contrary to that found by De Boer and Baquette (1998) in Mozambique, where little seasonal variation in resource use occurred in the Protected Area (PA) studied.

While usage patterns for teachers and pupils also indicate that they concentrate their educational use over the spring and summer months, the data suggest that the majority of teachers rarely used WNR. Just over two thirds of teachers use WNR once to twice per year. The finding that about one third of teachers and about two thirds of primary school pupils use WNR at least once every three months confirms this author's observations that WNR is primarily used by a few teachers of certain primary schools who have brought their classes to use WNR. This suggest that these teachers require ongoing support from within their own educational contexts and from the WNR management to ensure that any barriers to their ongoing use, such as transport for example, which has also been found in PAs in other

developing contexts in Africa (Johnson-Prynn and Johnson, 2005), are addressed. That the majority of secondary school pupils only use WNR once a year indicates the fragility of WNR usage by secondary schools in Mitchells Plain. Informal interviews with secondary school teachers indicate that many secondary school teachers are unaware if a structured educational programme to use WNR exists. Findings for schools therefore suggests that WNR management should take the lead together with other partners such as the local Educational Management and Development Centre (EMDC) and NGO's such as the Botanical Society to inform schools of visitation programmes. Combining resources to create programmes that are structured over a monthly, seasonal or annual basis would ensure that the educational use of WNR could happen on a meaningful scale. The involvement of NGO's in such an initiative has also been highly successful in California's urban PAs (Trzyna, 2001). While the economic value of practicing environmental education in this "outdoor classroom" compared to the costly need to travel to areas far away (e.g. Kirstenbosch) has yet to be directly estimated, WNR remains "undetermined beneficial" (after Dixon and Sherman 1990) at local level. The high seasonal use of both fisherfolk and educational users, particularly primary school pupils, over the spring and summer months suggests that if facilities are developed for their use, WNR might be heavily used by these groups over this period.

Findings show that besides fishing and educational use, other uses all groups enjoyed when visiting WNR such as relaxation, enjoying the scenery, birdwatching and exercising can all be classified as non-consumptive recreational use. Such data have been found to be crucial to future land use plans, because consumptive and non-consumptive activities are not compatible during the same time period (Burger et al., 1998). It indicates that a user programme that contains a user guide which identifies specific user sites and times should be jointly developed by WNR management and the main users of WNR.

Attitudes of fisherfolk towards their practice indicates that the majority did not support a permit system but supported a quota system. They wanted to fish without restrictions and almost all were of the opinion that only large enough fish should be caught. In addition, the majority felt that only a certain number of fish should be caught per visit. This was true regardless of age. Fisherfolk who visited WNR >10 years in particular felt that a permit system was protectionist and that it was a product coming from the past apartheid system. They felt that a quota system was more in line with the equitable distribution of resources under the new government and would assure them of enough fish to ensure their livelihoods. Together with socio-economic data, which reflects that the 60% of fisherfolk who live in the local community use WNR for subsistence fishing, and fish almost every day during the summer season, it indicates that fishing at WNR contributes to livelihoods of fisherfolk

residing in Mitchells Plain. It also indicates that there is a lack of research which explores the impact of fishing on local livelihoods, as was found by Petersen et al. (2005) for fisherfolk from coastal communities in three provinces of South Africa. Currently, there is no formal management arrangement between fisherfolk and the WNR management. The notion of a co-management model, which has become a term to refer to the involvement of fisherfolk in management of PAs in order to improve their livelihoods in a consultative and or collaborative manner (Isaacs et al., 2005), should be explored. This arrangement should be broader than focusing on the management of fish resources, as has been done in the past (Hauck and Sowman, 2003), and should become a mechanism to facilitate further capacity building and training (Petersen et al., 2005) and local economic development (Isaacs et al., 2005), in order for fisherfolk to actively participate in the management of WNR. The finding that the majority supported the notion that sustainable fishing can be achieved via a quota system and only catching fish large enough should be used as a starting point to jointly plan future sustainable fishing at WNR. Lessons from other contexts can be used to develop a marine PA plan for sustainable fishing utilization at WNR. For example, at the Leigh Marine Reserve in New Zealand only a certain number of mature fish (quota) are caught to allow juveniles to mature; at the Apo Island Reserve in the Philippines fisherfolk have changed their fishing patterns by fishing closer to the boundaries of the PA and only fish from the spillover of fishes inside the PA; and at the Hol Chan Marine Reserve in Belize where critical spawning sites have been designated and a closed season strategy has been implemented for certain species (WWF, 2005). In each case, stocks have increased by a minimum of nine times the original stocks (WWF, 2005). Such participatory approaches to fisheries management in PAs have been shown to be successful in other PA contexts such as the Caribbean (Geoghegan and Renard, 2002) based on the principles of the integration of the full diversity of stakeholders, suitable institutional arrangements, appreciable benefits for local communities, continued dialogue, shared decision-making, and using the best science as a basis for ecological and local economic success.

Socio-economic analyses have shown that fisherfolk who visited WNR for longer than 10 years and who had a higher education did not support the need for a permit, although all supported the need for the area to remain a nature reserve. These findings are similar to findings of Heinen (1993) for residency length in Nepal and Weladji et al. (2003) in Cameroon where the local community were more positive to the retention of the Park than to hunting concessions. The findings of this study for educational level and the rejection of fishing permits is similar to that for Weladji et al. (2003) in Cameroon where persons with increased education did not support hunting concessions.

When assessing teacher practice, findings indicate that teachers viewed 17 pupils per teacher as the ideal number to effectively use WNR for environmental education (EE) activities. The present poor use of WNR by about half of teachers of local schools suggest that barriers inside and outside schools, such as too large classes which could be up to 50 pupils, prevent teachers from using WNR. Teachers generally indicated that the use of WNR should shift strongly to the three learning areas of Mathematics; Human and Social Sciences; Science and Technology. This reflects the present narrow view of utilizing WNR in just a few learning areas, and is consistent with findings in the USA, (Ham and Sewing, 1987-1988) where the majority of teachers wanted to teach environmental education in natural areas in the Science learning area, and included the Human and Social Science learning area where there is human impact (Simmons, 1996). The fact that all teachers felt that they could use WNR in all eight Learning in the future is promising, and suggest that more needs to be done to work with teachers to identify opportunities in all learning areas in WNR. The lack of abilities by 92% of teachers to develop relevant resources mainly in the form of information packs containing worksheets, with or by specialists, is reason for concern. The poor understanding of the benefits of fynbos by the general public (Van Rensburg, 1987) and by teachers in formal schools (Lotz, 1997) has largely been as a result of the lack of suitable learning support materials. To compound this challenge in the formal schools context, a new curriculum, referred to as Curriculum 2005, which indicates that "teachers facilitate the development of learning support material to ensure that it is relevant and effective" (Department of Education, 1997a), was in the process of being introduced into schools. A compounding factor, also found by Wagiet (1991) for Grade 10 Biology teachers, was the limited exposure of teachers to fieldwork during their training. The above all signals the need for an In-service Education and Training (INSET) teacher development programme for all teachers who are currently using and intending to use WNR. Such training should correspond with the immediate needs of teachers and focus on WNR content and didactic aspects (Brijker et al., 1995). Teachers should be supported by being coached and advised on how to implement EE in WNR. They should take on the role of teacher-as-learner in a supportive atmosphere as successfully carried out by Bell and Gilbert (1994) with primary science teachers in New Zealand to ease uncomfortable feelings associated with learning, feeling incompetent or inadequate. The majority of teachers also indicated that they enjoyed visiting WNR as it gave them a chance to relax and engage in hiking. Hiking has been found to improve environmental literacy, group interaction, attitudes to sustainable utilization and improved awareness of pollution in the environment, especially if it takes place along interpretive trails, and can contribute to EE (Ferreira, 1998). The participation of teachers in developing curriculum-based hiking trails as interpretive trails in WNR could therefore greatly enhance the EE experience of future educational visitors to WNR.

Findings show that the majority of pupils in secondary and primary schools preferred subjects in the Biological Sciences as it allowed them to enjoy learning in the natural environment. Balantyne and Packer (2002) have also found that learning in the natural environment was attractive to New Zealand school pupils. They concluded that combining observation with instruction was a powerful teaching strategy as it impacted positively on their desire to look after the environment, their behaviour in natural areas, their household environmental practices and their understanding of the impact of humans on the natural environment. This suggests that conservation education programmes relating to WNR for primary and secondary pupils should start with a focus in the preferred Learning Area of Science and Technology whilst ensuring that information is accessible in all local libraries. This will increase awareness much more quickly and possibly lead to a greater awareness in the local community. The role of children in EE has already been demonstrated locally (Britton and Jackelman, 1995; Manuel, 1995) and in Europe (Uzzel, 1994), and their influence in the local community should not be underestimated.

Factors that influenced each user group's use of WNR were related to facilities desired by each group, communication and logistical drawbacks outside WNR, and management drawbacks inside WNR which acted as barriers to users. Problems related to facilities that ranked the highest among fisherfolk was the lack of a proper parking facility. Educational users ranked an environmental centre as the primary facility they desired. Such data are crucial in developing facilities that would also integrate second and third choices in order to be most beneficial to user groups because already low budgets have to be optimally used. The finding that fisherfolk did not experience any difficulty outside WNR which made visiting the area difficult is supported by the finding that fisherfolk have been visiting WNR for a long time, about 10 years on average, and that they are most familiar with visiting WNR. Educational users ranked the lack of information followed by a lack of transport as their first and second greatest drawbacks outside WNR which hampered their visit. This suggests that the WNR management should take the lead in promoting a communication programme directed at schools via formal educational channels as well as different local media of how schools can benefit by using WNR. Increase in awareness via information may also lead to increased support for conservation of WNR by teachers of local school. An increase in information about the PA has also been found to increase positive attitudes to conservation amongst indigenous peoples in Nepal (Sah and Heinen, 2001). A bus leaves Mitchells Plain daily to visit Kirstenbosch. This reflects the apartheid disparity still existing in resource allocation to nature areas adjoining less wealthy compared to more wealthy residents, and the lack of political will in re-directing this resource to the benefit of local educational users to visit WNR.

Increasing the level of safety, in the light of past robberies and paedophilic murders in the area (Swartz, 1994) could have been the reason why the majority of adult users ranked safety as their primary drawback inside the WNR. The findings of Weladji et al. (2003) for a conservation area in Cameroon found that an increase in security was followed by an increase in tourism use, suggesting that increasing security in WNR may lead to an increase in fishing and educational usage. Combating land pollution, identified as the primary factor by primary school pupils hampering usage in WNR, should also improve usage, as found at another lowland fynbos area called the Edith Stevens Nature Reserve, where the removal of all the land pollution by the Working for Water Programme (Noemdoe, 2001) and the opening of an environmental centre have led to improved usage by surrounding schools (T.L. Manuel, personal observation 2003). The identification that WNR is not relevant in school syllabi by 40% of the secondary pupils strongly reflects the socio-economic disparities in the educational system (McDonald, 1994) and strategies at the time of the study where environmental education was deliberately downgraded for non-white pupils due to the apartheid policies of the government prior to democracy in 1994 (Armstrong, 1995). The lack of WNR in school syllabi is probably also due to the transformation occurring in education at the time of the study (White Paper on Education, 1995), and the lack of teaching resources of the area.

4.2 Preferences

The results suggest that four types of interpretation information should be developed. A booklet on fishing information for fisherfolk, a general information pamphlet for all groups and a booklet on educational opportunities in biological sciences for secondary schools. For primary school pupils a booklet on plants and animals, with a particular emphasis on medicinal plants, understandable by a Grade 6 primary school pupil, should be developed. Lessons learnt from the successful participatory approach reported by Lotz (1996) for trialling the "We care package" for the Junior primary phase of learning would prove valuable in implementing the educational resources. Teachers who have completed INSET programmes on WNR could also develop interpretive, educational resources for future visitors. This approach had been successfully used at the Rio Bravo conservation and management area in Belize, where educators have used their newfound knowledge, experience and creativity to create interpretive resources in a low-cost, efficient way (Rome and Romero, 1998).

The findings indicate that visitation programmes and resources should be focused for each user group. This is similar to findings of Rome and Romero (1998) in Belize where different conservation education programmes and resources were developed for different audiences. Fisherfolk gave the highest ranking to guided tours paid for by the local authority, teachers

ranked information talks as most important, and using environmental education activity sheets was ranked first by secondary and primary school pupils. This is likely to be the core of the most cost-effective interpretation programme, which can start even before major infrastructure is developed (Rome and Romero, 1998). However, the development of programmes and resources for WNR should only proceed once there is a clear understanding of the links between these programmes and the needs of fisherfolk and curricular needs of the educational users. Close co-ordination in processes between WNR management and user groups would be an important pre-requisite for success.

Using WNR as a multi-purpose nature reserve with only non-consumptive benefits, such as relaxation, was accepted as the preferred land use by all user groups in this study. However, fisherfolk and primary school pupils who live closer to WNR were associated with wanting to use the area in a consumptive manner, as a playpark. About two thirds of primary pupils also wanted to use WNR as a camp site, but only if it was to be used for educational camps. The findings for fisherfolk and primary pupils are consistent with that reported by Burger et al., (1998) for land-use preferences of men and women at the Savannah River site in South Carolina. While the latter users wanted to use the PA in a consumptive way, they still wanted it retained as a multi-use PA.

The findings that none of the fisherfolk and 60% of the teachers did not support tourism is consistent with findings of Infield (1998) where only 4 of 151 (<3%) adult individuals perceived a positive link between tourists and revenue for the local community. The very high response from secondary pupils for tourism suggest an important shift in the attitudes of the youth to the perception that tourism will increase revenue and generate income in local communities. For tourism to be supported by user groups in this study, a feasibility study will have to demonstrate significant benefits to these groups. Additionally, no person in any user group surveyed owns or manages a tourism initiative. Should WNR be not be developed to meet the recreational, cultural and educational needs of users of the local community first, and be developed for consumptive uses such as tourism which benefits individuals or companies from outside these user groups, it would likely lead to resentment amongst users and local people, and the collapse of any conservation programme at WNR (Geoghegan and Renard, 2002).

4.3 Perceptions

With regard to WNR's perceived value, just over half of fisherfolk perceived its bequest value as its greatest value. Users in education perceived its historical value as its greatest value. Secondary and tertiary values across groups were strongly centered around its heritage and

biodiversity values. These findings indicate that the majority of users, regardless of their poor socio-economic conditions, perceive WNR as part of their history and as an important legacy for future generations. It has been argued that poor rural communities have little interest in the future of PAs (Oates, 1999; Terborgh et al., 2002). Results for poor users in this study, however, suggest otherwise. The very low percentage in each user group (<5%) who perceived any economic value such as jobs, harvesting firewood or picking plants in WNR, is in contrast with findings of Christiansen (1999, cited in Picard 2003) for the 800–1000 women who annually harvest 200 000 kg of incema grass from the Greater St Lucia Wetland Park in Kwazulu-Natal province, South Africa. These findings indicate that an educational programme is required to educate the main users of WNR as to how the conservation of the area fits into the broader socio-economic development of the surrounding local communities.

With regard to the perceived threats facing WNR, results indicate that the perception of feeling unsafe due to crime and the thick bush, as well as the perception that the area has deteriorated due to the rubbish dumping, were seen as the main threats to using WNR by all user groups. Thick bush (high tree densities) have been shown to both increase (Schroeder and Anderson 1984) and decrease a sense of safety (Kaplan and Talbot 1988). However, when viewing distances created by thick bush are severely decreased in inner-city landscapes and peri-urban nature areas such as WNR, other authors (e.g. Michael and Hull, 1994; Kuo et al., 1998) have found that thick bush then decreases the sense of safety. Together with instituting patrols which would accompany or watch over user groups, an alien plant control programme involving the thinning and removal of the thick bush should form part of management planning to ensure that all users feel safe to use the area.

Gender was associated with whether respondents felt threatened by crime. Female teachers perceived crime as a greater threat compared with male teachers. This finding is consistent with that of Warr (1985) who found that women urban dwellers felt more at risk from crime which Warr (1985) suggests for many women is fear of rape. Keane (1998) has found that fear of crime restrict women's mobility and suggest that changing hostile environments to more benign environments may produce a change in behaviour patterns. Males in secondary schools felt less threatened by crime than were female pupils in secondary schools. The findings for males is consistent with several studies (cited in Burger et al., 1998) that have shown that men tend to evaluate risks as smaller and less serious than do women (e.g. Stern et al., 1993; Flynn et al., 1994).

Factors such as residence in Mitchells Plain, age and education level were associated with whether or not respondents felt threatened by the thick bush in WNR. Fisherfolk living in

Mitchells Plain, teachers older than 35 and those who had completed Grade 10 plus 3 years, and secondary pupils over the age of 15 years were more likely to feel threatened by the thick bush. This was probably due to these groups having received more information about unsafe activities in the local media (see e.g. Swartz, 1994; Burbidge, 1995) which had occurred in the “bush” near the coast.

Age and residing closer to WNR was associated with whether respondents felt threatened by rubbish dumping. Secondary pupils >15 years old and primary pupils living <1 km from WNR perceived rubbish dumping as a greater threat than were those <15 years old and those living > 1km from WNR. The fact that older pupils who were generally in Grade 11 compared to Grade 10 felt that this was threatening was because they were specifically given the task to quantify and graphically represent findings after doing pollution studies in WNR. This suggests that heightened understanding of the pollution problem leads to greater feelings of being threatened by rubbish dumping. The perceptions, especially by those primary pupils living <1 km from WNR is consistent with Wilson and Kelling’s (1982) “broken windows” thesis. As these primary pupils see the reserve on a daily basis in viewing it from their schools or when they return home, the visible signs of urban decay, such as for example, accumulated litter, can precipitate withdrawal and mark the area as vulnerable to vandalism and crime (Kuo et al., 1998). This then in turn creates a downward spiral of deterioration and fear.

4.4 Understanding of the term conservation and knowledge of the flora and fauna

This study found that almost a third of fisherfolk and over half of educational users did not know what the term “conservation” meant. About one third of all user groups held protectionist or preservationist notions about what conservation of WNR meant. These findings are higher than that found by Preston (1989) for professional ecologists, where only 10% understood conservation to mean preservation of plants and animals. It is lower than that found for business leaders in the same study, where 47% understood conservation to mean preservation of plants and animals. Picard (2003) suggests that protectionist and preservationist notions will deepen tensions between users and protected areas. It will also increase the feeling that nature conservation is associated with dispossession and the apartheid policies of the past government (Cock and Fig, 2000). Brechin et al. (2002) argues that the protectionist model of conservation failed in South Africa because it overlooked the social and political processes in which conservation is deeply immersed. The recognition by teachers and secondary pupils that conservation should also take into account cultural community development for future generations holds some promise. The results above suggest that education programmes for users should be designed to impart the type of conservation knowledge which provides users with a more holistic view of conservation and

which sees people and local communities as part of biodiversity conservation. This view supports the findings of Caro et al. (2003) who have shown that student attitudes towards biodiversity are crystallized as a result of the knowledge of conservation issues they obtain, and it depends on the type of teaching to which they are exposed. The perception of conservation as “protecting the PA for future generations”, corroborates surveys around parks in Ecuador, Nigeria and Cameroon, where people also perceived conservation as protecting the PA for future generations (Fiallo and Jacobson, 1995; Ite, 1999; Bauer, 2003).

The flora and fauna knowledge scores obtained in this survey provides a starting point to raise awareness and increase knowledge amongst users of plants and animals found in WNR. The low flora (1.2 to 2.6) and fauna (1.3 – 3.1) knowledge scores amongst users could be explained by the low frequency of use of the area as well as the lack of proper interpretation materials to identify plants and animals. Another explanation is that at the time of the study, there were no formally constituted awareness raising programmes directed at users.

For plant identification, to the level of family, only 4 of the possibly 65 families were correctly mentioned and for genus level, only 25 of the possible 179 genera were correctly mentioned. For animal identification, 4 of the possible 6 families and 3 of the possible 21 genus names were correctly identified (City of Cape Town, 2001). This suggests that improving the knowledge at genus and/ common name level for plants and animals could be a strategy to increase overall floral and fauna knowledge scores. The fact that the majority of teachers could identify plants as fynbos at the veld type level holds promise and suggests that improving teacher’s knowledge of plants and animals will lead to improved knowledge amongst secondary and primary pupils. The improvement of plant and animal knowledge at WNR should become an important component in a WNR teacher INSET programme, especially the focus on pre-visit learning activities and post-visit reinforcement. White and Jacobsen (1994) have shown this to be a successful strategy, as test results proved that the knowledge of students who visited urban environmental centres and parks in Colombia, improved significantly for those students whose teachers participated in a conservation education programme, prior to the visit of the students.

Although no comparative data exist for plant and animal knowledge scores for other lowland fynbos sites, animal knowledge scores for adult users (1.3 to 2.6) were about four times lower than that found for migrant communities (9.8 to 15.6) near Way Kambas National Park in Sumatra, Indonesia (Nyhus et al., 2003). However, in this study, respondents were asked to recall names of animals while in the Indonesian study, respondents were shown photographs of the animal, which probably accounted for the higher scores.

The finding that users in all user groups who had been coming to the area for a longer time had higher flora knowledge scores than those who had been visiting for a shorter period, suggest that they had more opportunities to interact with the flora or with information provided about the flora. That male teachers had higher floral knowledge scores than female teachers can be attributed to the fact that male teachers accompanied students on more visits to WNR as it was thought that school groups would be safer with males.

The finding that primary school pupils who lived <1 km from WNR had higher flora and fauna knowledge scores than those living >1 km from WNR suggests that their schools visited more often or that they interacted with WNR out of the formal school programme. That Grade 7 primary pupils had higher flora knowledge scores and Grade 11 secondary pupils had higher flora and fauna knowledge scores than their counterparts in Grades 6 and 10 is not surprising, as increased interaction with the area over more than two years for these groups would provide more opportunity to increase floral and faunal knowledge, compared to their counterparts who had only been part of the WNR programme in the year of the study.

Findings in this study for fisherfolk who had a higher educational level having higher fauna knowledge scores is consistent with that found in Indonesia (Nyhus et al., 2003). Nyhus et al. (2003) suggest that formal education probably accounts for a higher comfort level with the question-and-answer interview format, as was carried out in this study, which could explain why fisherfolk with higher educational levels in this study had higher knowledge scores. The fact that fisherfolk had higher fauna knowledge scores than teachers with Grade 12 plus 4 years education is surprising and suggest that fisherfolk had increased opportunities for exposure to the animals of the area than did teachers.

5. Concluding comments

WNR is still largely used by fisherfolk and less so by educational users despite the lack of infrastructure, poor funding and management challenges. Findings in this study have shown that a co-management arrangement between WNR management and user groups in this study, as well as other relevant stakeholders, should ensure that usage remain sustainable. WNR managers should take the lead to address factors such as safety, especially of female teachers, the lack of facilities inside WNR, and the lack of a communication programme in the community and its absence in the formal school curriculum. Findings of this study should be used to develop interpretation materials and visitation programmes that effectively address users' needs, enhance positive, and counter negative perceptions of users. Education programmes should be jointly designed to ensure that users gain a more holistic view of conservation and are able to increase their knowledge of the flora and fauna using methods

that are most effective e.g. using common names. This would increase and ensure their ongoing support for the conservation of WNR. To achieve this, capacity building of fisherfolk to jointly develop WNR as a marine PA, and an INSET programme for teachers where they are supported and could develop resources in order to implement EE in WNR, appear to be crucial to the sustainable utilization of WNR. The potential benefit of WNR for EE in local schools has been recognized by all user groups. Why teachers use WNR, how they use and could use WNR, the challenges they experience, and what support is required for them to effectively use WNR is thus of critical importance. This forms the focus for the next study.

University of Cape Town

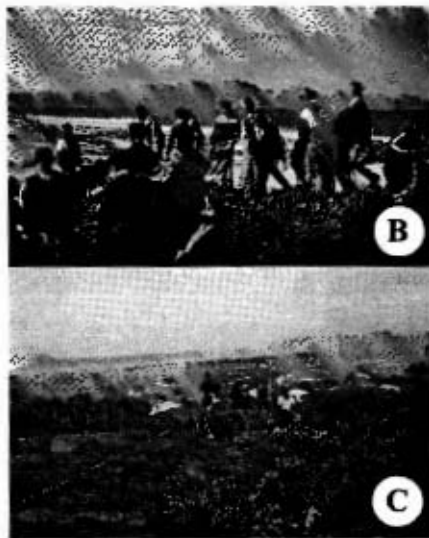
CHAPTER 5.5

RESPONSES OF TEACHERS

TO USING

WOLFGAT NATURE RESERVE

FOR ENVIRONMENTAL PURPOSES



University of Cape Town

CHAPTER 5.5

RESPONSES OF TEACHERS TO USING WOLFGAT NATURE RESERVE FOR ENVIRONMENTAL EDUCATION

1. Introduction

It has been increasingly accepted that biodiversity conservation in PAs is supported if it provides benefits to local communities, both internationally (Adams and Hulme, 2001; Hulme and Murphree, 2001; Brechin et al., 2002) and locally (Wells, 1996; Picard, 2003). Education has been widely accepted to play an important role in demonstrating benefits (Fiallo and Jacobson, 1995; Weladji et al., 2003). The management plan of WNR strongly emphasizes that the current and future management of WNR has to be based on the inclusion of environmental education (EE) in order to promote sustainable utilization (City of Cape Town, 2001). The central issue in this study was thus to understand teacher responses to utilizing WNR for EE and the supportive processes needed, to achieve sustainable education utilization of WNR.

The study should be seen in the context of ongoing change and uncertainty in the wider educational environment. At the time of embarking on a process to utilize WNR, in the period 1995 – 1997, teachers had to respond to educational transformation (White Paper on Education and Training, 1995), after the demise of apartheid in 1994 (Reddy, 2001; Wilmot, 2004). In the period, 2001-2002, teachers again had to respond to the implementation of a national policy called Outcomes-based Education and Training (OBET, referred to as OBE), which strongly advocated the use of the local natural environment (Department of Education, 1997a,c).

The aims of this study were primarily to investigate the responses of teachers to using WNR as part of their curriculum. Secondly, I wanted to establish what other themes emerged when exploring teachers' responses to using WNR particularly with regard to management issues associated with the reserve. The above activities were done to see how sustainable educational use of WNR by teachers of local schools could take place within the educational environment and the overall management programme of WNR.

2. Methods

The study was conducted with teachers drawn from the 68 Primary and 20 secondary schools in the Mitchells Plain community (see Chapter 2, section 2.3.). At district level, the education environment mirrored that of the national educational environment, which is described in detail in Chapter 3, section 3.3.5. The process of investigation is described in detail in Chapter 4, particularly the methodology (section 4.3.1), data collection (section 4.3.2) and data analysis procedures (section 4.3.3).

3. Results

3.1. Themes which emerged from the workshops, reflective interviews and data generated through the grounded theory process

Two overarching themes comprising seven sub-themes emerged from the workshops, reflective interviews and data generated through the grounded theory process (Table 5.5.1). These were: 1) Teachers use of WNR because of its educational value as a resource- which was divided into three categories: Why and how teachers use WNR and the implementation challenges related to its use; and 2) The need for supportive processes to use WNR, which were divided into four categories.

Table 5.5.1. Themes which emerged from the workshops, reflective interviews and grounded theory process.

Short working title	Detailed titles
1. Teachers use of WNR relates to its educational value as a resource.	Teachers use of WNR relating to a) Why teachers use WNR; b) How WNR can be used; and c) Challenges to implementing environmental education related to WNR in local schools.
2. Need for supportive processes to use WNR.	a) Teachers' participation in curriculum and resource development; b) Managing educational change and how teachers respond, in order to ensure the ongoing use of WNR; c) Management actions needed to create an enabling environment to use WNR; d) Ongoing need to examine if the educational use of WNR by teachers is sustainable under current conditions.

3.2. The main theme: Teachers use WNR because it has educational value as a resource

3.2.1. *Why teachers use WNR*

The main theme which recurred throughout the study related to “teachers participate and use WNR because it has educational value as a resource, and want to use WNR in a certain manner” (Figure 5.5.1). Many attributes (sites, plants and animals) in WNR can easily be

studied, and thus are of direct educational value to teachers. Teachers all agreed that the reason why they use WNR and would continue using the area because it has educational value as a resource (WS 1). They all further indicated that the different areas in WNR present different educational opportunities which they can use in their practice. A teacher who was involved prior to this study mentioned that in 1993, teachers primarily used WNR to create awareness against developing the area for housing and as a form of resistance to apartheid policies. He indicated that while the area was not primarily considered for its educational value before, it did have political value.

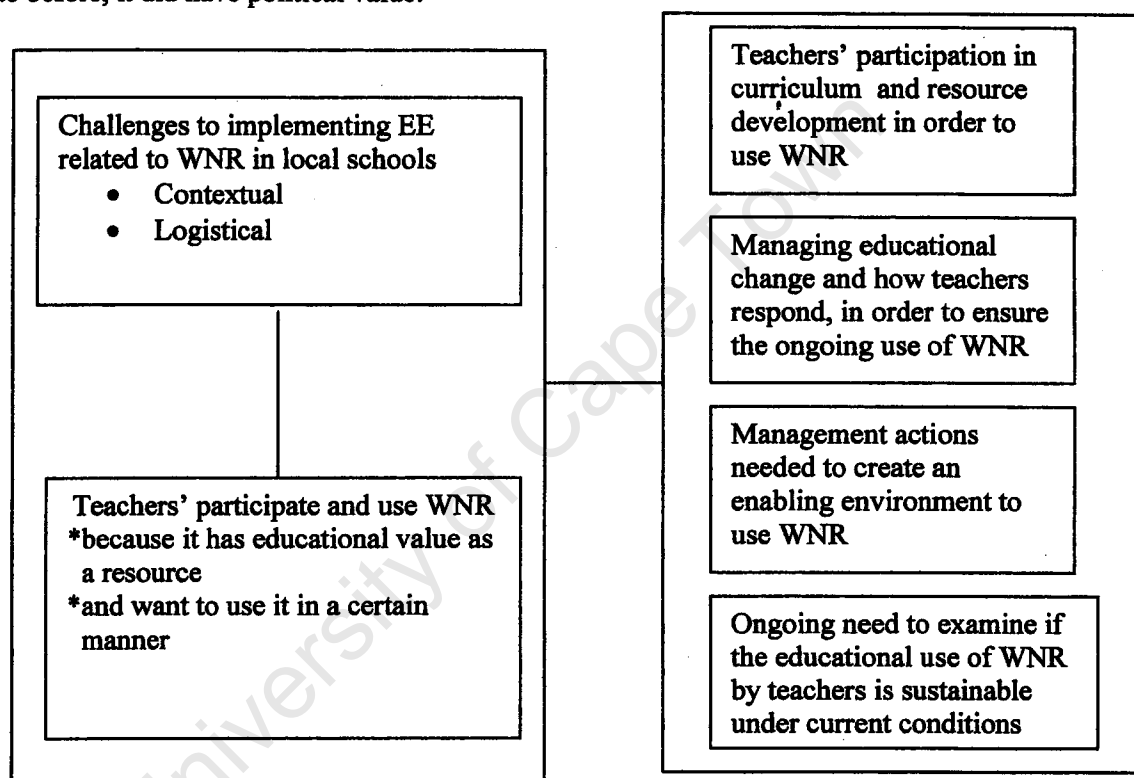


Figure 5.5.1. Graphical representation of why teachers use WNR, the associated challenges and the supportive processes identified by teachers to use WNR.

3.2.2. How teachers can use WNR

Teacher identification of how WNR can be used related to: WNR's attributes, reason for their choices, threats, the learning area related to the educational value of these attributes, as well as the applicability in Primary and Secondary schools. This is illustrated in Table 5.5.2. The three main attributes identified by teachers are particular sites, the plants and certain animal species. Teachers identified the main threats to these attributes as pollution, alien plants and urbanization. The three applicable learning areas identified were the Sciences, Mathematics and Human and Social Sciences. The attributes can be used in both Primary and Secondary schools. The majority of teachers who use WNR came from Primary rather than Secondary schools.

Teachers explained that the use of WNR needed to be well planned. At district level, they felt that a participatory, annual, structured, co-ordinated, practical macro-plan between teachers, educational and conservation managers needed to be developed. Teachers in a focus group session remarked that “there should be better co-ordination between the local educational district office and WNR management” (WS 3). Macro-plans should provide guidance with respect to learning opportunities at certain times of the year. At school level, micro-plans aligned to curricula should be negotiated between teachers in the same phase of learning as well as between teachers and school management. Teachers should also enjoy the support of their principals.

Teachers also indicated that certain paths and sites would need to be set aside for educational use and others identified for ongoing study and monitoring of issues such as pollution and invading alien plants. Paths and sites identified by teachers to be set aside for educational use during excursions, workshops and focus group interviews (WS 3, WS 4, FG 2) are illustrated in Figure 5.5.2.

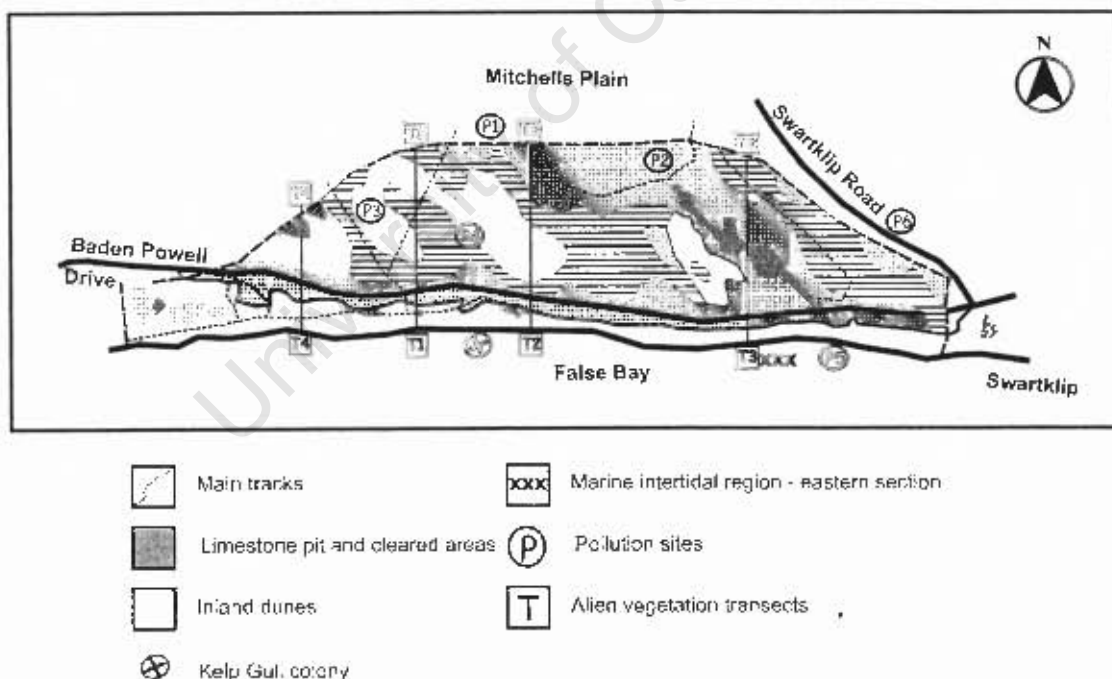


Fig. 5.5.2. Paths and sites identified by teachers to be set aside for educational use and for monitoring studies on issues such pollution and invading alien plants.

schools particularly in the three learning areas namely: the Natural Sciences, Human and Social Sciences, and Numeracy and Mathematics (see Table 5.5.2).

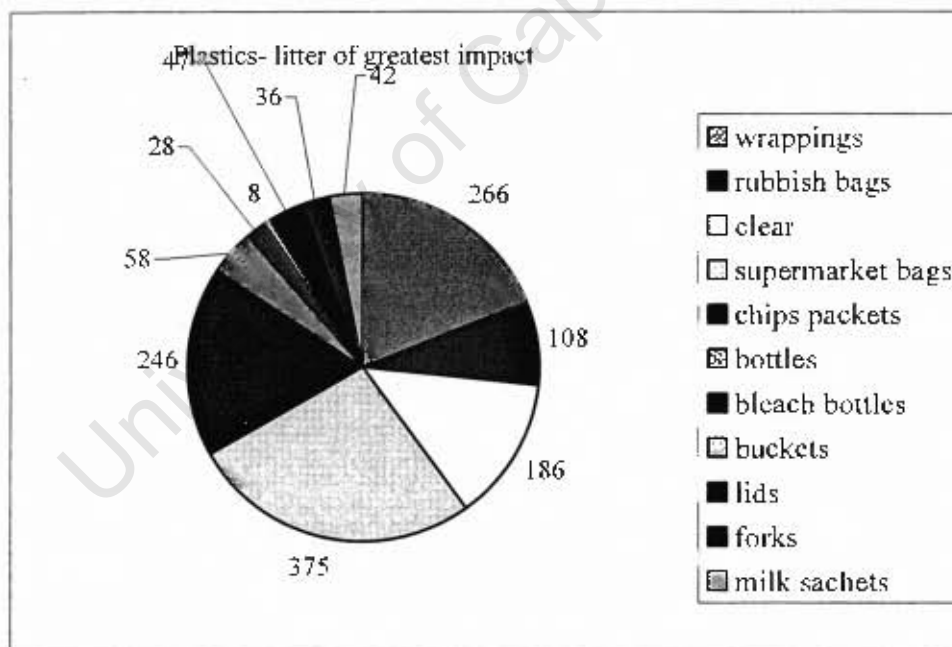
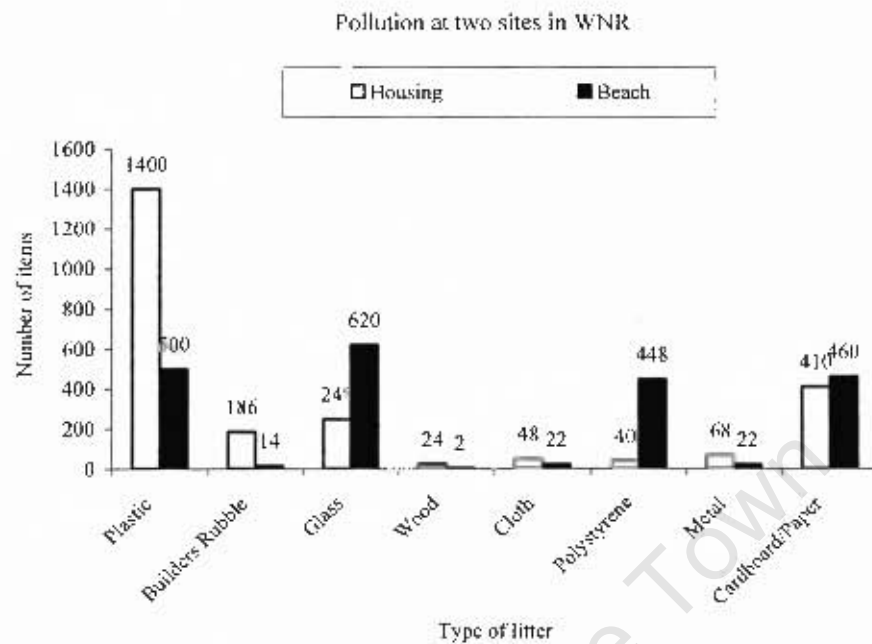
Box 5.5.1. Using the WNR to do the pollution audit: Stories of active learning and pupil participation

The story of how Huguenot Primary used WNR as a resource for active learning: Theme: Pollution

"On Women's Day, 9 August 1995, I accompanied three teachers, Ms Sias, Ms O'Riaan, and Ms Classen together with 45 Grade 6 pupils on a visit to WNR. Each of the teachers taught the pupils a different subject but did this study together as a cross-curricular project in their phase of learning. This is their story as summarized by them.

"We walked into WNR along the main track closest to our school. Our children were well-behaved as we had prepared them before in class by showing them a video of WNR, explained the introduction worksheet and explained the apparatus and method of the litter audit. The audit method and audit kit was trialled and developed in the teachers' workshop and we were to clean the site near the houses closest to our school. This site we selected in the workshop after our teachers excursion into WNR to look at learning opportunities in WNR. We stopped along the path to introduce WNR to our pupils using the introduction worksheet. This went very well. What helped a lot was the assistance on the day mentorship of Mr. Tyrone Humphries of our neighbouring school, Searidge Park, who had already completed this study. After this, we divided the pupils into three teams of 15 pupils each. Each team was supervised by a teacher. Each team in turn had three groups of three. For our study, a 50 m section was measured along the path with 15m on either side of the path. We had thus defined a plot 50 m X 30 m. Each team stood behind each other in a straight line along the eastern side of the site, all facing east to west. Each pupil stood 2m apart and had a black bag. Team 1 walked forward and collected all the macro-litter (>10 cm in diameter) and each pupil placed the litter into the black bags. Team 2 followed and did the same. Then team 3 followed and did the same. This ensured that all the litter was collected and we did not miss any. Everyone was very proud that we made a difference in cleaning our environment. Each pupil carried his/her black bag back to school, where it was stored in three piles, one per team."

"On Monday 14 August 1995, we continued with our study during our Science lesson, under Ms Sias who teaches Science. The litter was placed on a large groundsheet in the quad and each group used a litter data sheet to count a part of the litter. The caretaker, Mr. Daniels had contacted the municipality who collected the litter after we completed the counting. The data sheets were given to Ms O'Riaan that afternoon who worked with the groups the next day, 15 August, in the Maths class to compile team data sheets and later a class data sheet. The following day, 16 August, the class was given the data and we drew bar graphs of our findings and also a pie graph of the litter that had the greatest impact on the "near housing" site. The next week, we also got the data of Ridgeville Primary who did the study near the beach in the same sized plot. In this way, we could show our pupils how litter affects the reserve at different sites in WNR. The findings are illustrated in the graphs below"



In the Geography lesson with Ms Classen on 17 August, we had a critical discussion on the Human impact on the environment, using WNR as the resource. We discussed the impact on the plants, the costs to the taxpayer for cleaning the area and how the dirty area stops people from visiting WNR for relaxation and recreation.”

“What we have learnt is that cross-curricular, issue-based learning using an active learning approach with WNR as the resource, can take place. Our pupils were able to experience the ecological, economic and social aspects of environmental education.”

The story below was related to me by Mrs Pam Snyders. She and another teacher took her 40 Grade 7 pupils to WNR on 22 August 1995 and did active learning activities near the beach. I accompanied them and relay her story.

"On arrival in WNR, we introduced the pupils to the area using the introduction worksheet. We designed our own worksheet using the pamphlets and information from the "Discovering WNR" guide. The children really enjoyed identifying the different plants and discussing their medicinal value. This activity actually formed part of the Science syllabus for that week. We formed two groups of 20 each and went on to do the litter audit at our 50 m X 30 m plot. We followed the standard method and were able to count our litter at the car park when we returned to our bus. We had arranged with the municipality before the visit and they did pick up our bags at the car park. We went back to school and used the information in our Science, Maths and Geography lessons. We also shared our data with Huguenot Primary and they shared theirs with us."

"What was exciting about that study is that the children saw their story in the community newspaper (see article below in "scene around"). This has had a positive effect on our parents. One parent made us a "No litter" sign. We have now adopted this plot and even went to erect this sign there. Our information of this year we will use as a basis to monitor pollution again in next year when we come to our plot again."

doi:10.1016/j.jmb.2006.05.005

THESE INTERESTING and often surprising facts about the world of the 1950s are the subject of *My Father's America*, a new book by the author of the best-selling *My Mother's America*. The book is a collection of 100 short, witty, and often surprising facts about the world of the 1950s, as seen through the eyes of a young boy growing up in the 1950s. The book is a collection of 100 short, witty, and often surprising facts about the world of the 1950s, as seen through the eyes of a young boy growing up in the 1950s. The book is a collection of 100 short, witty, and often surprising facts about the world of the 1950s, as seen through the eyes of a young boy growing up in the 1950s.



Hume's
 story —
 Franks the
 President
 General
 George
 and the
 World
 Future
 History
 Science
 Summer
 Study

[illegible]

Use: 100% Pure, 100% Natural



ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED EXCEPT WHERE SHOWN OTHERWISE
DATE 08-22-2011 BY 60322 UCBAW



Teachers identified seven barriers to using WNR which could be placed in two categories namely: Logistical and teacher capacity-related barriers. Logistical barriers were: (1) lack of infrastructure facilities such as an information centre in WNR, (2) safety of staff and pupils when using WNR, and (3) transport to the reserve for schools not immediately adjacent to WNR. Teacher capacity-related barriers were: (1) teachers' lack of knowledge of WNR and fynbos processes, and ecological field skills, (2) teachers' lack of ability to develop and produce curriculum resource materials, (3) the recognition that primary schools use a more generalist learning area approach that could easily incorporate thematic, issue-based teaching and secondary schools a more disciplined-based, which is more content-driven; (4) time for meetings after schools should be negotiated as teachers have family and other commitments after school. The lack of teacher knowledge and skills to use WNR was further amplified by a questionnaire personally administered to 38 teachers just prior to the workshop programme to determine teachers usage of WNR in their teaching and ecological skills. It revealed that 7 of 29 (24%) primary and 4 of 9 (44%) secondary teachers, taught ecological concepts relating to WNR. Eleven (38%) primary and 2 (22%) secondary teachers had field trip experience, although 14 (48%) primary and all 9 (100%) secondary school teachers had done ecology during their teacher training.

3.2.3. Challenges to implementing environmental educational use of WNR in local schools

The challenges as well as what was recommended by teachers to overcome these challenges are now described. Five main challenges were identified from teacher responses which could be placed into two categories: contextual and logistical challenges. Contextual challenges were: 1) the involvement of senior staff at schools; 2) provision of an INSET programme; and 3) addressing teacher development of teachers who wanted to use WNR. Logistical challenges were: 1) the management of large classes; and 2) support from bodies external to schools, such as university students, during the initial implementation phase. I will briefly report on each of these challenges illustrating this by means of responses gathered during the interviews. I then go on to report on the key factors identified by teachers, which allowed teachers to overcome implementation challenges when using WNR.

3.2.3.1. Contextual challenges

Involvement of senior staff at schools

Some teachers indicated that they did not feel that implementing the use of WNR was going to work in this year as normally their Heads of Department (HOD) had already printed most of the worksheets for lessons, without consulting teachers (Focus Group 1 i.e. FG 1). These worksheets they had used to teach environmental issues in the previous two years. One

teacher mentioned that she felt that she was given little chance to give input to what would be taught and how it would be taught and just needed to “deliver the goods”. “He is the HOD doing my assessment, and he again is assessed by the principal, who wants the school to run smoothly”, she said. Another teacher indicated that her principal wanted all learning to be written down in notebooks. She found this problematic as many activities in WNR involved the application of skills (II 2). Some teachers indicated that they found it easy to implement thematic, issue-based teaching at their school where the principal (W 6) or HOD supported this approach and was part of this change process to teach in this way. They also ascribed it to the HOD attending the workshops with them (FG 1, FG 2).

Provision of an INSET programme

Teachers indicated that ongoing provision of INSET programmes to teachers who wanted to use WNR would be crucial if WNR was to be used in local schools (FG 3). It should form part of educational policy at, and take place at a district level (FG 3, II 4). Teachers felt that they should be able to attend these programmes as part of their professional development within school time, generally for the last hour of school (FG 2, FG 3, II 2, II 3). They felt that such programmes should address the lack of capacity in the following areas:

- skills to organize and plan the learning experience to go to WNR as time needed for planning remained a challenge (FG 3, II 3);
- an understanding of fynbos processes and the flora and fauna in WNR;
- how to manage the implementation of an issue-based learning programme over a whole school term

(II 3). Teachers indicated that this approach allowed them to understand the pollution curriculum unit

much better (FG 2);

- planning investigations to reflect progression over a phase of learning, for an intermediate phase (II 1);
- the use of practical curriculum resources such as user guides and issue-based learning programmes developed with, and by teachers during workshops for the implementation process (WS 2, FG 1);
- facilitating large groups when using WNR (FG 1, II 3, II 5);
- evaluation of learners’ after using WNR as skills to be evaluated need to be identified prior to using WNR (II 1, II 3); and
- teacher confidence and competence when doing pollution or alien vegetation investigations (II 3).

Addressing teacher development

Ongoing interactions during workshops and excursions into WNR, together with a review of the workshop and interview data revealed that teacher development was not only needed to use WNR, but also came about when using WNR. Teacher development involved personal, professional and social development of teachers. In this manner, the current and potential future value of WNR in improving teacher practice could also be identified. The challenge posed during implementation was to ensure ongoing creation of those enabling opportunities which resulted in practices which made using WNR possible. Simply, what is required and what makes teachers want to use WNR?

On a personal level, two aspects of improvement in practice through the INSET programme were identified. These were: (1) the willingness of teachers to attend voluntarily; and (2) the feeling of being empowered. Teachers indicated that they volunteered to attend workshops after school hours because they accepted that they could use WNR as a resource in their practice (FG 2, FG 3; II 1, II 3). This indicated that using WNR could improve their situation and respond to problematic aspects of their practice. Many teachers went ahead to use WNR despite constraints such as having to deal with large classes, the initial lack of learning programmes to do issue-based learning and the lack of curriculum-aligned resource materials.

Teachers also indicated that they felt empowered by the workshop process and by progressively gaining confidence via collective planning with other teachers from their own schools, and teachers from other schools to use WNR (WS 6, FG1, FG 2). Teachers who undertook issue-based investigations of pollution and alien plant threats (II 2, II 3) felt that they had acquired skills in areas such as: (1) organizing for issue-based learning within a phase of learning over a defined period such as a school term; (2) mastering field methods for ecological investigations; and (3) knowledge required to teach fynbos in the local environment.

In response to how using WNR improved their personal development, the following are some of the responses: "Even though it was difficult taking two large classes to WNR because of being understaffed at school due to the rationalization programme, I still wanted my pupils to experience WNR and start thinking critically about environmental issues. With the help of the university students, I still took them to WNR and will continue irrespective of the conditions at school" (FG 3). Another teacher said "I had very little support from other staff members at school, but with support from WNR teachers at Searidge primary I could implement the pollution unit into my workscheme" (FG 3). Another reported that "The workshops had showed me that I can use my own local environment, while current syllabi of the education

department focus on examples and areas away from the reality of Mitchells Plain” (FG 1). Other teachers indicated that “Empowering teachers on excursions with field skills and fynbos knowledge via a skills course is what we want, we don’t want to be assisted all the time, we want to handle the vegetation in WNR ourselves” (II 1, II 2). Another teacher mentioned that he “felt empowered when organizing and managing the excursion, and facilitating learning with pupil groups in WNR” (II 3).

On a professional level, six aspects of improvement in practice through the INSET programme were identified. These were: (1) community involvement in environmental education; (2) Using local resources to teach in a relevant way; (3) Use of previous monitoring information as a basis for ongoing teaching; (4) teaching in a learner-centred manner; (5) cross-curricular teaching; and (6) developing a local resource centre. These are described below.

Teachers mentioned that they used WNR to try new activities to improve their practice in the following way:

- (1) Two teachers invited community members to share their knowledge on WNR with pupils. At a primary school a grandparent and at a Secondary school, a rasta (i.e. a member of a cultural group collecting medicinal plants in WNR) spoke to pupils on using and ways of protecting the medicinal plants in WNR;
- (2) Some teachers used local newspaper clippings and other information pamphlets on WNR to put together a lesson on “introduction to WNR” so that pupils were aware of its location, flora, fauna and other attributes;
- (3) Another teacher indicated that “I used the previous monitoring information as an introduction before coming to WNR” (FG 2);
- (4) A few teachers reported that they implemented introductory worksheets and the pollution audit learning programme developed during the workshops. They relayed that their teaching had changed from classroom-based, memory-centred to an issue-based, skills-based, participatory and learner-centred approach than when they used the textbook in class” (FG 1, II 3). One teacher relayed that “when analyzing and discussing audit results in class, pupils understood what constituted litter and where it originated from.” (II 2). “They also felt proud that they could make a difference”. One teacher went on to add that “I have incorporated the pollution audit into my work scheme and will monitor my plot again in six months time. The pupils will then do the whole audit. They will then compare it with audit results of other audit plots”. “I feel that I will then only need to facilitate the learning process. This will also make them feel that they are not alone and part of solving WNR’s pollution problem”, he said (II 1);

3.2.3.2. Logistical challenges

Management of large classes and provision of support from bodies external to schools

Teachers also indicated that the management of large classes in WNR posed a problem as learning was more effective where small groups could each be guided by a facilitator, either another teacher from the school, or a person from a supporting organisation (II 4, II 5). Where partnerships were developed between the WNR programme and supporting organisations, implementation of using WNR to teach issue-based learning was generally successful. Assistance was provided by persons from organizations such as the Botanical Society of South Africa, and safety officers from the local authority (WS 3).

3.2.3.3. Key factors which allowed teachers to overcome implementation challenges when using WNR

The key factors identified by teachers, which allowed teachers to overcome implementation challenges were where teachers:

- found support from others such as their principals and other staff members. This also took the form of adjustments to timetables to enable participating classes to have a two hour lesson in WNR (FG 2, II 1, II 2, II 5);
- Are provided with a local INSET programme where areas in which teachers lack capacity, are identified by teachers themselves (FG 1, FG 2, FG 3);
- Were involved in a teacher development programme which addresses all three aspects of teacher development in those practices which made using WNR possible (FG 2, FG 3);
- Work collaboratively in order to identify those areas of improvement in their practice (FG 2);
- Worked together as a team in the same phase focussing on thematic, issue-based teaching (FG 1, FG 2);
- Of the same school were part of their environmental club. This not only enhanced their teaching, but they could also work together in their time together to convert their investigative findings into posters which they used as learning resources in the classrooms (FG 3);
- Used the previous years results as a basis for the present year's investigations (FG 3); and
- Had support from organizations external to the school when using WNR (FG 2, FG 3).

The current and potential future value of WNR, was thus identified by teachers in that it could act as a resource to bring about the above positive changes in their practice (FG 1, FG 2, FG 3, II 2, II 3).

3.3. The identification of supportive processes to use WNR

Below follows a description of the four supportive processes identified as needed for teachers to use WNR. Firstly, the curriculum and curriculum resource materials development process was identified as being crucial to the long term use of WNR. The second process was the need to manage educational change and how teachers respond, in order to ensure the ongoing use of WNR. The third related to the management actions needed to create an enabling environment to use WNR. The fourth related to the ongoing need to examine if the educational use of WNR by teachers is sustainable under current conditions.

3.3.1. Teachers' participation in curriculum and resource development

In order to use WNR, teachers interviewed agreed that the development of a curriculum wherein WNR can be used should have two elements: 1) It must be developed within a local context with the active participation of teachers and the local community; and 2) It must be developed to address issues in a thematic manner. Teachers also agreed that while they did have some problems with developing resources, the manner in which resources are developed must be underpinned by an open, non-managerial, non-prescriptive process which entails support from more experienced educational practitioners.

Teachers agreed that there was a need to develop "a local curriculum", but that it should involve the active participation of teachers who would identify relevant areas in subjects and grades where WNR could be used. The participation of the local community was imperative if teaching were to link with environmental issues (II 1) and address problems in the community (II 2, II 3). Teachers felt that this participatory process was different to that of the Education Department which just sent textbooks to be implemented. A teacher from Searidge Park Primary indicated that he "did not know how to develop a local curriculum, did not know who normally developed the curriculum, and remained ill-informed of the process" (II 1). Evidence of teacher participation to develop a local curriculum is reflected in workshop number 4 (Table 5.5.1) as teachers set aside this workshop to engage in ongoing reflective enquiry in order to review and align syllabi, develop curriculum units and discuss issues of assessment.

Teachers also indicated that in order to use WNR, thematic approaches should be developed which included continuous evaluation (WS 4, II 1, II 2, FG 2). Teachers felt that they needed assistance from senior staff members, HODs and subject advisors for this (FG 1, FG 2, II 1). A teacher at the school adjacent to WNR indicated that "although I am willing to participate, I

am unsure as it takes a lot of time". Teachers felt that it was worth doing as "this was different to the departments' curriculum, which is top-down and lacked local relevance" (II 2, II 3).

Teachers indicated that the manner in which resource development was approached in the INSET workshop programme (e.g. WS 5) allowed them to identify relevant issues and resources. Extracts from an interview with focus group 1 illustrate teacher feelings regarding this: "I liked the workshops as they were non-prescriptive, allowing us to select the topics based on the problems identified in WNR. Later, when we used the introductory worksheets and litter data sheets developed during workshops when doing the Science lesson in WNR, it made our teaching relevant, issue and skills-based, rather than using the prescriptive way we use the textbook to teach about the use of apparatus".

Ongoing support by the researcher to smaller groups working in teams at schools resulted in more authentic participation in resource development. An extract from focus group 2's interview describes how this took place. "We met as a small group once a week until the end of term to implement the pollution learning programme. Theo's visits and inputs to our meetings helped us keep focus. Activity sheets developed during workshops were tested and adapted in order to implement the issue-based approach over the term. We now have a full set of resources to do this learning programme effectively the next time".

In developing resources in a participatory manner, a collegial relationship was built up between teachers. This relationship went beyond the workshop to teachers assisting each other to implement the resources in WNR. A comment made by a key informant (II 2) illustrates this. "Although we as a group tested the pollution unit resources, the assistance in the field by a teacher from the neighbouring school who had already done the audit, made us understand the resources even better. This made easier for us to adapt the resources to our needs".

Contextual challenges such as time and large classes at schools made it difficult to develop issue-based resource materials. This was illustrated by comments by two workshop participants. "It takes time to prepare worksheets adapted to your own needs to be used in WNR, so one just uses those developed in the workshop" (II 3, II 4).

3.3.2. The need to manage educational change in the ongoing use of WNR: teachers' views from workshop discussions and interviews -in the period August 2001 to May 2002

Using extracts from six workshop discussions, informal interviews conducted after class visits and a final focus group discussion, several themes emerged pertaining to using WNR in a period of change when implementing the new OBE curriculum. Direct extracts are used to illustrate teacher responses.

The first theme was that of resistance to change due to feelings of professional uncertainty, feeling disempowered and not being consulted. Teachers felt that although they knew how to do issue-based investigations in WNR, they found it difficult to align it to the OBE outcomes. They felt they needed to work together with education officials, needed more guidance and felt disempowered by all the jargon. The extract below illustrates this. One teacher in focus group 3 indicated: "We know we can use WNR to do OBE, but we need to work with the department officials, so that we can feel confident that what we are doing, is what is required. They just interact with us in a theoretical way, using a lot of terms, which need to be explained in a practical way. I cannot just implement theory." Another teacher indicated that "I find it difficult to develop a learning programme on WNR to do OBE because I am unsure if it will be accepted by the department. It was easier to just use WNR in the prescribed syllabus" (FG 2).

The second theme which emerged which made it difficult to use WNR in the period of change was that of the micropolitical realities of schools. Two teachers indicated that although they were committed to implementing the use of WNR in their teaching, it was difficult as they needed the approval of their HODs. They indicated that: "They (HODs), because of their power positions, just gave us the OBE documents with poor explanations, and insisted we implement other easier examples, which works easier with larger classes, in order to show that OBE works. These were not always locally relevant". Another teacher mentioned that: "My principal supports me using WNR in my lessons, but says it is too difficult to adjust the timetable once a week for my classes to use WNR for three periods, as he would have to change the timetable, affecting others".

A third theme was that of teachers' acceptance of changes and a willingness to comply. At the final focus group meeting, one teacher indicated that she saw the implementation of OBE in the use of WNR as a process. She indicated that she believed that using the planning grids of the department will work if we just plan. She said: "If we just do our planning as explained in

the OBE documents and organize the school accordingly, we can go to WNR and do our OBE lessons in WNR”.

The fourth theme which emerged and was supported by three teachers was that of teacher support for implementation of OBE in using WNR under the following conditions:

- The school must be within walking distance from WNR;
- Learning programmes and associated resources such as worksheets and field methods must have been tested and available;
- Teachers must have had time to visit WNR prior to the start of the learning process;
- Teachers must be flexible, personally motivated, with a passion for the environment;
- Teachers have a supportive environment (both in terms of with colleagues and materials) at school.

This was reflected in a statement by one teacher who indicated that: “I find it easy to use WNR for OBE as it is a five minute walk into the reserve and I have used it before. I have always worked in an OBE fashion, and involved my children in projects. I am currently studying for my Bachelors degree in education and this has helped me as we have dealt with OBE there. I have used the pollution and alien plant curriculum units and resources we developed in the Wolfgat workshops before, which made it easier as I did not need to re-invent new stuff. I have also linked with the Working for Water Programme who have given me some resources”.

3.3.3. Management actions needed to create an enabling environment to use WNR

The interviews with the responsible Education and Reserve Managers were conducted to determine if they thought WNR can be used by teachers and the main issue which was withholding teachers from using WNR. These are reported below.

3.3.3.1. Educational Management Responses to using WNR: Interview with a chief curriculum advisor of the Education Department

An interview was conducted with the chief curriculum advisor of the Education Department to get an idea of how WNR can be used in OBE. The interview was held at the District office in March 2002. The transcript follows:

Me: Do you think teachers can use WNR in their teaching?

GvH: Yes. The WNR is ideal for cross-curricular teaching, but, especially for Science, Geography and Mathematics. The two biggest factors hampering using WNR is that the area is not developed for educational activities and the lack of resources. We (the education department) with the WNR management must take the lead and work with teachers to inform

the development and the production of resources. The WNR teachers have done a lot but this now need to be co-ordinated via our office, with a proper annual programme.

Me: Can WNR be used effectively in teaching in an OBE manner?

GvH: I believe it can be, but that is going to take time and a focussed programme of teacher development. Our department has run workshops to provide an overall introduction on what is OBE and how to plan for it. However, this will not be enough in order to capacitate teachers fully to use WNR in OBE. We are short staffed and will need help with that. Teachers and the council will have play their part and form part of the planning and success of such a programme. Again, the sustainability and ongoing support of such a programme need to be worked out.

3.3.3.2. Reserve Management Responses to using WNR: Interview with the WNR manager of the Managing authority

A further interview was conducted with the WNR manager to get an idea of how the reserve has been developed for educational activities. It was held during April 2005 at their Cape Town offices. The transcript follows:

Me: Do you think teachers can use WNR in their teaching?

AF: Yes, the place is ideal for environmental education, but should be developed. Using the WNR must a co-ordinated effort between council, education department and teachers. This must happen if we are to effectively use the place.

Me: What then is the problem with developing the area?

AF: The problem is that it is now 2005, and the Environmental Management Plan of 2001 has still to be approved by council. It must first be approved by the chairpersons of both the Khayelitsha and Mitchells Plain sub-councils. I must contact them. Plans for the environmental centre have already been approved but the Environmental Plan not. The people of the area must start putting pressure on their community leaders such as councillors to develop WNR, as it is constitutionally correct that each person has the right to a healthy environment.

3.3.4. The ongoing need to examine if the educational use of WNR by teachers is sustainable under current conditions.

During the final focus group meeting in May 2002, teachers and myself reflected on the study and tried to link fundamental events in educational developments at national and provincial policy level within the context of OBE, to the current use of WNR. Teachers felt that this could act as a model against which to measure if the current manner in which WNR is used would be sustainable. We used a blackboard to brainstorm our impressions and agreed that a big picture emerged with two distinct streams (Fig. 5.5.3). One stream on the left related to

how the education department was formally implementing OBE and the other described how teachers were presently using WNR.

Teachers indicated that as the educational policy allowed them the freedom to select resources, they identified WNR as a resource that they could use for OBE. When attending INSET workshops provided by the education department, “the focus on OBE jargon rather than explanations relating to local examples made it difficult to apply the same principles to WNR”. The difficulty of the lack of curriculum resources and linking with other teacher networks to draw on their experiences also made implementation of OBE in WNR more challenging. Teachers indicated that if they were consulted as to what the OBE programme would address, the programme would have been more relevant and would have met their needs, especially in using WNR as a resource for OBE. Teachers also indicated that in the manner they are presently using WNR made sustainable educational use of WNR very difficult. This was due to the ongoing logistical and contextual challenges, coupled with unstructured and unco-ordinated programmes which are not supported by the education district office and WNR management.

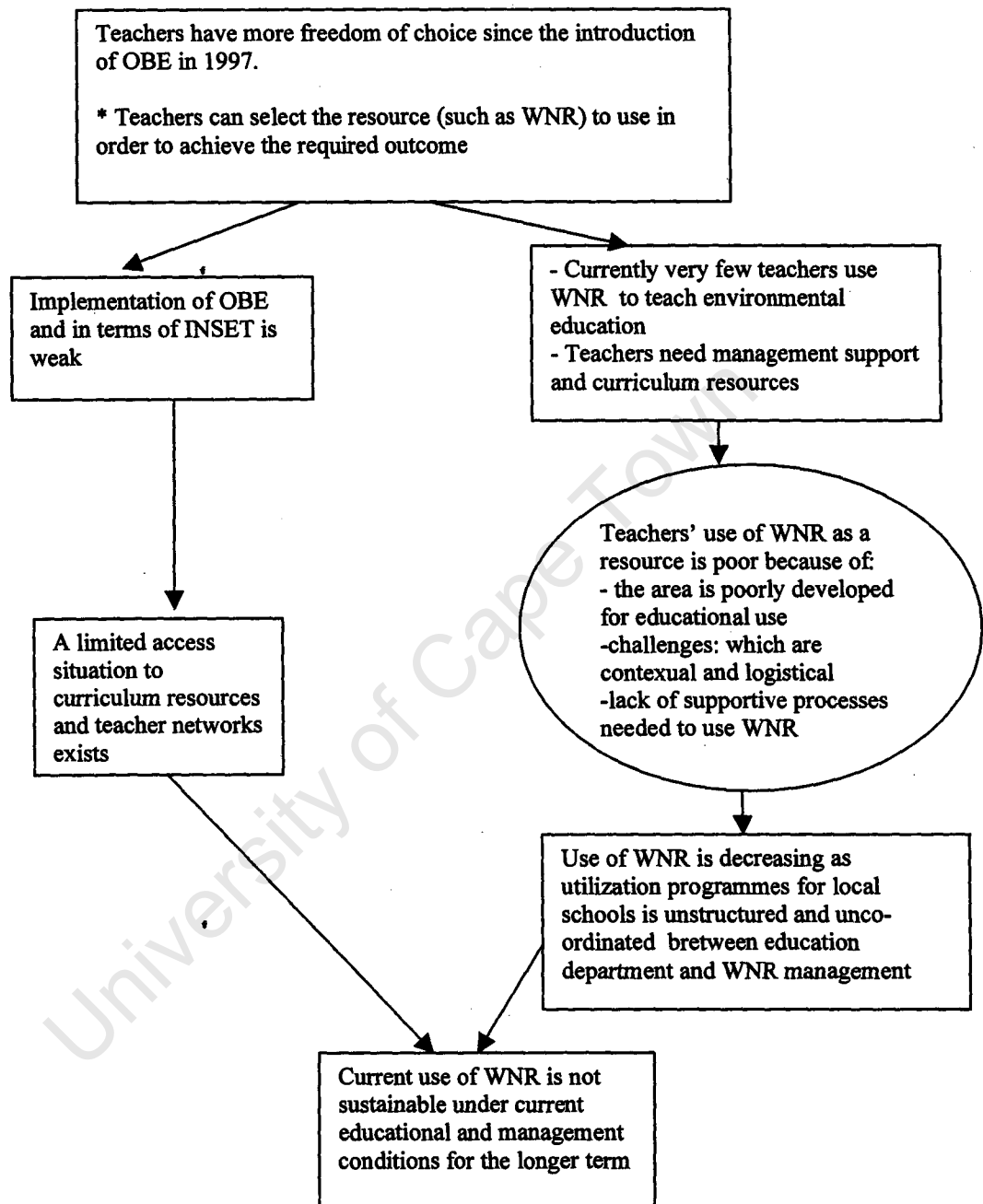


Figure 5.5.3. Teachers' evaluation of how the current use of WNR relates to the implementation of the OBE policy at national and provincial level. The stream on the left relates to how the education department was formally implementing OBE and the stream on the right describes how teachers were presently using WNR.

4. Discussion

If local teachers are to use the Wolfgat Nature Reserve (WNR) for environmental education (EE), then any way forward has to consider their motivations for using educational attributes (settings) they identified together with the barriers such use presents. It will also have to consider the training and development of teachers and the supportive processes needed to use the area for EE, within the educational context they find themselves, as these are inextricably linked. In considering the findings of this study, it would appear that using WNR is complex as it is affected by many different factors both inside the reserve, outside schools and within schools. This discussion is not intended to provide a complete set of solutions, but rather discusses the two key aspects that would improve the use of WNR within a sustainable management programme. Proposed in this multi-faceted approach are the following:

- Teachers' use of the reserve for EE;
- Supportive processes needed to use WNR.

4.1. Teachers' use of the reserve for EE

In most cases, it is the teachers' beliefs and perceptions of the importance and requirement of providing environmental education to students that determines whether teachers will use an urban nature area (Simmons, 1996; 1998). Should teachers want to use WNR to teach EE, we must understand why they want to use the area, how they want to use the area and what challenges they experience to implement EE in preparation for, and when using WNR.

4.1.1. Why use WNR?

The findings indicate that teachers used WNR because they believed WNR has educational value as a resource. This is significant as research in the field of teacher education have concluded that the motivations behind what teachers believe about using protected areas for education and how they can use this in their practice are fundamental, as this impact on their motivation to engage in activities in the protected area and in their classroom practice (Richardson, 1996). Teachers also believed that WNR is a living laboratory close enough for schools to easily walk to and visit. WNR presented them with different educational settings (attributes), each setting acting as a resource where a distinct set of EE activities could be done (Simmons, 1998). It also provided students with direct contact with the natural environment, which is considered quality education (Simmons, 1998). They also recognized that presently, as EE is an integral part of the curriculum (Department of Education, 1997a), WNR as a resource allows them to achieve curriculum objectives.

Evidence provided show that a small urban reserve like WNR (248 ha), which is undeveloped and highly contested for alternative land use, will continue to be used by teachers presently and in the future as an educational resource. This is consistent with findings for other small protected areas in or near large cities. The Costanera Sur Natural Park (320 ha) in Buenos Aires in Argentina and Yatsu-Higata wetland reserve (40 ha) in Tokyo in Japan are of this type and is used primarily for education (Phillips and Gay, 2001). In London in the United Kingdom, the contested Rainham Marshes reserve (375 ha), has also been identified by teachers and reserve managers as an area where education will form a large part of its use (Phillips and Gay, 2001). For WNR to be used by teachers in the future, logistical issues such as the development of educational facilities needs to be addressed. A communication programme within schools, around educational opportunities in WNR, should re-inforce the belief system of teachers that WNR can be used as an educational resource.

4.1.2. How could WNR be used?

The results in this study have shown that teachers' beliefs of how they could use WNR to teach environmental education across the curriculum depended on what educational opportunities they associated with various attributes (settings) they identified. This also had implications for the learning areas they would select, their learning pedagogies and if the activities selected would have a positive impact on students' environmental learning. As WNR was not extensively used as an educational resource prior to this study, it follows that teachers would identify the barriers to them using WNR.

The data indicate that teachers believed that certain educational opportunities generally associated with fieldwork have greater value for use in WNR. Findings indicate that teachers primarily chose ecological (sites) and biological attributes (plants and animals) within which certain learning areas, and hence certain curriculum activities, can be done. In this study, all teachers indicate that Science could be taught by using each of WNR's attributes. These findings are consistent with those from the USA (Ham and Sewing, 1987-1988; Cantrell, 1987; in Simmons, 1996), the latter using Project WILD, where the majority of teachers (63% and 77% respectively) wanted to teach EE in natural areas in the Science learning area. As found by Simmons (1996), it suggests that specific settings (attributes) provides certain education opportunities and results in teachers choosing certain curriculum activities. It is more probable that because most teachers in this study primarily taught Science, they would more easily suggest this option. The finding that teachers included Human and Social Science at settings where there was human impact and chose Science in more natural settings is consistent with findings of Simmons (1996). When testing teachers' perception of using four natural settings for EE, she also found that urban teachers endorsed Social Science more

highly in an Urban Nature setting and Science more highly in more rural-like settings such as in Rivers, Deep Woods and a Country Park, than other subjects such as Art and Language.

These findings also suggest that developing those attributes identified by teachers (e.g. certain paths and sites) as well as jointly developing programmes in learning areas mentioned above that have particular value, would provide a good start to use WNR by already motivated teachers. The finding that teachers could identify activities in all Learning Areas where WNR could be used suggests that an awareness should be created amongst teachers of local schools to counter the perception that WNR can only be used for Science, Human and Social Science and Mathematics. Given that the environment is a central tenet in all Learning Areas in the South African curriculum (Department of Education, 1997a), developing attributes that will allow teachers to connect these settings with other learning areas will also re-inforce the belief of teachers that they are able to use WNR across the curriculum.

Results show that teachers used WNR as a resource for active learning. They engaged students in active learning pedagogies in both the issue-based pollution and alien plant investigations. These findings are similar to that found by Lotz (1996). She found that, as with local, under-resourced school teachers who used WNR in this study, junior primary teachers developing materials for EE found using the local environment as a resource non-expensive, as it did not require expensive technical equipment. The finding that teachers were successful at developing simple worksheets and learning programmes to guide their activities and audit procedures for pollution and alien vegetation concurs with that of Lotz (1996) who also suggests that using the local environment for active learning motivates teachers to develop materials that are not expensive or technically difficult. Ballantyne and Packer (2002) cautions that teachers who use the natural environment should not over-structure the learning activities they design. The finding that teachers believed that planning the use of WNR and resource materials development should occur collaboratively between them and the educational and reserve managers, suggests that planning and resource materials development around active learning programmes in WNR should be understood and planned by all three parties, to ensure that any usage programme is successfully implemented.

The findings illustrated in the stories of active learning show that teachers using WNR have a positive impact on students' environmental learning by engaging them cognitively, emotionally, and morally. These attributes have been widely recognized in EE as the basis for developing environmentally responsible citizens having the knowledge, attitudes and skills beyond that of a mere understanding of scientific and ecological principles (Simmons, 1996). It confirms observations by Ballantyne et al. (2001) that by engaging students emotionally by

focusing on evidence of environmental problems, the effect of the problem and efforts needed to solve the problem, fulfils one of the aims of learning in natural environments. It does so by stimulating students to think about human impact and mismanagement on the natural environment (Ballantyne and Packer, 2002). The evidence presented in the active learning story that children planned for their litter to be collected by the municipality after their pollution study indicated that students undertook problem-solving and decision-making within a real world setting (Ballantyne et al, 2001). By going back to erect a signboard and continue the monitoring process, they gained a desire to maintain and restore natural areas (Knapp, 1990). The finding that active learning worked best when students were engaged in pre- and post-excursion activities is consistent with that of other authors. Pre-visit preparation as carried out by teachers in this study, has been found by researchers to be a critical part of a field trip programme (White and Jacobson, 1994). Preparation, active participation and reinforcement of conservation information influence the cognitive and affective gains of students (Bitgood, 1989; cited in White and Jacobson, 1994). Ballantyne and Packer (2002) found that this increases their anticipation, enjoyment of the visit and feelings that they are solving an environmental issue. Terry (2000) has shown that post-excursion analysis of data and reflection of EE activities as found in this study developed students' problem-solving and decision-making skills. These activities provided the necessary conditions for children to become catalysts for environmental change in their own community (Uzzel, 1994; Johnson-Prynn and Johnson, 2005). By teachers using WNR for active learning, children were able to raise awareness via newspapers in their communities (de Bruin, 1995; 1996).

Data presented in this study show that children have been able to gain very limited support from their parents in environmental learning. This is similar to findings in developing countries such as Tanzania and Uganda, where investigators found the lack of parental and community support for environmental projects constituted a barrier to project success (Johnson-Prynn and Johnson, 2005). Very limited parental support for environmental education via active learning in urban natural settings has also been found for an impoverished black community in urban settings in Texas, USA. (Khan and Friedman, 1998). While parental involvement in planning and assisting teachers with using WNR for EE has not generally been found in this study, Tal (2004) has shown that teacher-parent collaboration in a middle-class school in Israel in using the local natural environment has been highly successful. Six to eight field trips occur for each class every year and are related to the Science, Environmental Education and Social Studies Interdisciplinary School Curriculum. This suggests that socio-economic challenges in the community and contextual challenges within local schools around WNR provides barriers to teachers using WNR within a context of teacher-parent collaboration.

Evidence in this study suggests that teachers identified both logistical and teacher-capacity related barriers which kept them from using WNR effectively. The finding that WNR cannot be used effectively as an education resource until the area is developed concurs with that reported for Rainham Marshes reserve, in London, England, where the area has also been identified for educational use by teachers and reserve managers (Phillips and Gay, 2001). Simmons (1998) who assessed perceived benefits and barriers to using four natural settings (rivers, deep woods, country par, urban nature) for EE, found that the setting with the highest worry index was urban nature, mainly due to safety concerns. In this study, the overwhelming majority of teachers also identified safety as the barrier to them using WNR. As in this study, the lack of resources such as transport has also been cited as a barrier to using natural areas for EE in developing contexts such as Tanzania and Uganda in East Africa (Johnson-Prynn and Johnson, 2005).

This study has shown that teachers use of WNR to varying degrees of success was dependent on their confidence and knowledge about the activities they engaged in. This concurs with the notion that teachers' decisions to carry out certain activities is dependent on their level of confidence and their sense of being well prepared to teach EE (Simmons, 1998). For example, teachers engaged much more successfully with the pollution than with the alien vegetation curriculum unit. This was probably because teachers had more knowledge about litter as all were previously involved in recycling programmes at their schools. This was probably also because the issue could be used for cross-curricular teaching and engaged students emotionally (Ballantyne et al., 2001) in solving an environmental problem. In order to conduct the alien vegetation unit, teachers needed knowledge of plant identification and ecological field skills. Not preferring to use WNR for carrying out this unit is probably due to findings in this study that teachers did not feel confident due to their lack of knowledge of WNR and the fact that less than 40% of primary and secondary school teachers had field trip experience. It also concurs with findings of Agyeman (1998) in England and Wagiet (1996) in Cape Town, South Africa, that teachers who are unfamiliar with the ecology of an urban nature area where alien plants occur, do not have the confidence and use these settings. Simmons (1998) has also found that teachers are least confident and find teaching EE most difficult in an urban setting compared to three other settings. The lack of a ranger/education officer, as was the case in WNR at the time of this study, also contributes to teachers not using an urban area for EE (Agyeman, 1998). The results also suggest that in order for WNR to be used effectively by teachers, time should be set aside where programmes address teachers' knowledge and skills. Teachers should be assisted to engage in active learning programmes that help teachers develop action competencies (Uzzel, 1994) and confidence in working in the urban environmental setting such as WNR.

also worked with the reserve manager to develop as a booklet to introduce WNR to other teachers and the general public (Wood, 1996). This process was contrary to that found by Lotz (1996) for the initial trialling of the We Care materials. In this study, teachers were integral to, while in her study, teachers were separated from the generic materials development process. As with teachers in the We Care project (Lotz, 1996), teachers in the WNR study also experienced tension between developing their own curriculum materials and finding time to be part of such a process. As found in this study, Lotz (1996) also found that smaller groups which are provided with support during implementation of curriculum materials, are able to implement new curriculum materials much more effectively. The findings in this study also echo the notion that contextual constraints differ from school to school and that it would not always be possible to implement "teacher-proof materials" (Kirk, 1990) which would bring about effective learning in all contexts.

Evidence presented in this study show that there was a definite need to manage teacher responses to the educational changes that were occurring within the South African education system. There existed a high degree of teacher professional uncertainty as teachers grappled with using WNR within the changed educational framework called OBE which was introduced in 1997 (Department of Education, 1997a). The feelings of disempowerment and lack of clarity found in this study are consistent with findings of Mintrop (1996), Polyzoi and Cerna (2001) and Reddy (2001) who found that teachers who have been systematically disempowered by being subjected to authority patterns over a long period, display insecurity and calls for direction on how to approach their work. This is especially evident when an authority vacuum comes into existence when previous forms of domination disappear (Fullan, 1993). Teachers' display of self doubt and pinning their hopes on finding someone else's solutions to the complexities of their own work have also been found by other authors who explored teacher responses to educational change (Fullan, 1993; Dadds, 2001).

The example of micropolitical relationships found in this study where a HOD exerts his power in order to implement OBE is similar to that found by Blasé (1998) and Ball (1987) for British studies where those in power positions maintained control over decision-making and school policy. In South Africa, Reddy (2001) also found that micropolitical relationships intensified during periods of change, which affects teachers in that they have less time to "retool their skills and keep up in their field" (Hargreaves, 1994).

The teacher at the final focus group meeting who indicated that she was willing to simply implement OBE when using WNR displays what Fullan (1991) refers to as "false clarity". Here change is interpreted in a superficial way, emphasis is placed on superficial procedures

and technical issues, and where the focus is on implementing change as painlessly as possible (Blackmore, 1998). The same teacher "Wanting to simply re-organize the school accordingly", also indicates a limited view of change, as Reddy (2001) found that changing of timetables would mean a change of the entire timetable structure and operations at schools.

The findings that some teachers supported the use of WNR within an OBE framework under certain conditions indicates that certain factors appear to be important to implement change successfully. Their personal motivation, flexibility, availability of resources and supportive school contexts seemed to be the factors which made them support change. This is consistent with findings of Borko et al. (2000) and Reddy (2001) where teachers have responded positively to implementing a new curriculum. Responses of teachers to using WNR indicates that using WNR within an OBE framework provides more possibilities for curriculum innovation than was the case in the past (Wilmot, 2000). However, understanding the complexities of the OBE curriculum and its associated assessment model (Department of Education, 1998), would present an important barrier to teachers needing to use WNR within an OBE framework. This suggests that the notion of praxis should underpin the development of critically reflexive teachers who strive towards practical, foundational and reflexive competencies outlined in policy (Department of Education, 1999).

Findings based on interviews with education and reserve management suggests that the co-ordination and management of a programme for teachers to use WNR is going to prove challenging. What they do agree on is that the area must first be developed for educational use, and that its use should be co-ordinated by a tri-partite arrangement comprising of education and reserve management and teachers. What appears challenging is that while the focus of education managers is on preparing teachers to use WNR within an OBE framework, the Environmental Management Plan is still to be approved by local authority councillors. It appears that the answer lies in the two institutions working together with teachers where a focused INSET programme for teachers forms an integral part of the management plan of WNR. The possibility of a university-schools relationship entailing a formal contract through a learnership model would also have financial benefits for schools. This could take place through the Sector Education and Training Authorities which is part of the state's Human Resource Development strategy (Department of Education, 2001).

Teacher responses to see if the use of WNR is sustainable suggest that one co-ordinated teacher use programme relating to WNR should be in place. It also appears that using WNR as a resource to implement OBE would have to entail a different model to the department's Cascade model, which focused on "thin" or procedural knowledge, but rather on a model that is based on consultation, participation and declarative knowledge, which was a key finding of

the Review Committee on the new curriculum called Curriculum 2005 (Chisholm, 2000). The finding that teachers felt that experiences should be drawn from other teacher networks suggest that teacher competence for using WNR can be achieved in an INSET programme through explicit modeling and experiential learning, as described in Wilmot (1998; cited in Wilmot, 2004).

5. Concluding comments

Given the importance of using WNR for environmental education, this chapter has foregrounded why and how teachers use could use WNR for environmental education. It is clear that teachers consider WNR as an educational resource, which acts as a living laboratory close to most schools in the local community of Mitchells Plain. In order to integrate the use of WNR across the curriculum, initiating a programme of use by motivated teachers in the Science, Social Sciences and Mathematics learning areas using active learning strategies would provide a good start. Using WNR for active learning motivates teachers to develop learning materials that are not expensive or technically difficult. However, it is clear that WNR presents teachers with different educational settings, where distinct EE activities can be done in each setting. This could allow teachers to achieve the curriculum objective of integrating EE across all learning areas. There is thus a great onus on the reserve management to provide teachers with enabling opportunities to identify an increasing diversity of educational opportunities. How reserve management introduces WNR to teachers may well determine which environmental educational goals will be met during school visits to the area. The responsibility thus rests on the reserve manager to provide the necessary imagery. By utilizing more settings, the likelihood of integration across all learning areas and parental involvement could be achieved. Using WNR for active learning have also been shown to have a positive impact on students' environmental learning in that students were engaged cognitively, emotionally and morally, attributes recognized in EE as the basis for developing environmentally responsible citizens.

This chapter has also highlighted the challenges that need to be addressed for teachers to use WNR. While logistical barriers are easier to overcome, teacher-capacity related barriers will prove more challenging. The need for education officers or guides that works within a district-level planned programme for schools, that are knowledgeable, enthusiastic and well trained in education and communication techniques to work with teachers will go far to address teacher-capacity related barriers. Contextual challenges such as the support of senior staff at schools also appears crucial if teachers are to use WNR in their classroom practice. It is clear that a teacher INSET programme to use WNR should form an integral part of the management plan of WNR. Such a programme should involve teachers in its planning,

implementation and evaluation. Such a programme should also ensure that all supportive processes such as curriculum and materials development, and the need to manage teacher responses to educational change described in this study are addressed. A programme entailing a university-schools relationship could ensure the development of reflexive practitioners who can respond to policy and can develop competences for using WNR through explicit modeling and experiential learning. With teacher INSET being part of strong tri-partite arrangement between education, WNR management and teachers, I contend that sustainable educational use of WNR by teachers can be achieved.

University of Cape Town

CHAPTER 6

**CONCLUDING COMMENTS AND
POSSIBILITIES FOR FURTHER RESEARCH**



CHAPTER 6

CONCLUDING COMMENTS AND POSSIBILITIES FOR FURTHER RESEARCH

6.1. Introduction

Following the dawn of democracy in South Africa in 1994, lowland fynbos PA managers realized that participation in decision-making on the use and future of these areas by local communities was imperative if these areas were to survive amidst the pressures of poverty and other urgent socioeconomic needs. WNR is such a lowland fynbos conservation hotspot, and found itself, despite its biodiversity and education worthiness, requiring the input of community user groups into its management, or face being lost to these pressures. Although the fynbos community responded to such challenges with the C.A.P.E. project (Cowling and Pressey, 2003) in 1998, it failed to consult local communities to provide clear priorities to guide management strategies (Gelderbloem et al., 2003). Even beyond 2003, an evaluation of the Cape Flats Nature (CFN) project launched by the City of Cape Town, concluded that “there is no alternative but to involve local communities in conservation of urban lowland fynbos sites” (Soal and van Blerk, 2005). However, the CFN project has still to identify priority uses for an area such as WNR.

The research in this project has been exploratory in nature covering broad areas of how community user groups, living adjacent to WNR, perceived, used and intended to use the area. Challenges for WNR, as well as its role in other socio-economic development themes, were also identified.

In investigating the responses of community user groups to using WNR, I have focussed on four key areas, namely: responses of residents and community leaders of the neighbouring community; responses of two adjacent, culturally different communities; responses of three key user groups (fisherfolk, teachers and pupils); and responses of teachers in their educational context. Each study’s findings are now discussed in terms of the use of WNR and how it can be improved. As such, each section ends by evaluating the findings against the management plan. This is done in order to bring about appropriate changes in management practices, policies and actions. By drawing on the above, implications for: a) community participation in the biodiversity conservation of a site such as WNR; b) the work of CFN; and

c) local educational policies and actions, are discussed. I conclude the chapter by exploring possibilities and questions related to further research.

6.2. Key Findings with user-specific inputs into the management of WNR

Several key findings illustrate that users identified WNR as important area that can be used to benefit the local communities and that with improvements and various forms of support, user groups would continue interacting with the area.

6.2.1. Responses of residents and community leaders to the current and future role of WNR

Gaining sufficient knowledge on how local communities use and intend using protected areas is considered crucial to demonstrate tangible benefits to these communities and for building community support (Harcourt et al., 1986; Durban and Ralambo, 1994). An important finding in this study is that in its present non-upgraded state, there would be low use with a low frequency by both groups, with just over half of community leaders and one third of residents preferring to only use WNR annually. Both groups cited their primary reason for not using WNR as the threat of crime/gangs. If upgraded, with both groups citing an information centre as their primary facility, the majority (at least three quarters) in both groups would use WNR at least once per month. Community leaders who had visited WNR before did not view crime as a threat, while residents who visited and those who did not, viewed crime as a threat. The above findings echoes the findings of Khan (1994) that residents and key interested parties who did not visit, or who were poorly informed about WNR, held negative perceptions and attitudes to WNR. That both groups supported environmental education as the primary non-consumptive use and ecotourism as their primary consumptive use is heartening, as both these have been identified as key management policies in the management plan (City of Cape Town, 2001). Khan (1994) also found that respondents of the Mitchells Plain community identified the primary value of WNR as an environmental education resource for local schools. However, while environmental education has been identified as a priority project, eco-tourism has not been identified as a project to be implemented. Another important finding is that >90% in both groups supported the polluter-pays principle. This needs to be applied seriously in the day-to-day management in order to prevent rubbish dumping, also cited as one of the key reasons by both groups for not visiting WNR.

The research has also shown that socio-economic variables influenced residents and community leaders' views on using WNR once upgraded. Residents with a higher educational level and a higher income, were more positive to using WNR for environmental education. Residents living in Mitchells Plain for less than 11 years were more positive to using WNR

for recreation. Community leaders other than in the business sector supported using WNR for environmental education while those in the business and education sectors supported using WNR for recreation. This suggests that a media campaign for the different groups should first target these individuals with socio-economic attributes who are positively inclined towards WNR.

According to the management plan, the reserve manager is responsible for all policies and projects that are to be implemented. The recent appointment of a reserve manager only in late 2003 indicates the slow pace at which the recommendations arriving from this study would be integrated into the management of the area.

The need to adequately fund sustainable management and infrastructure development in WNR has been identified as far back as the mid-1980's by Jarman (1986). More recent thinking at community level has been that the development of WNR should be an integral part of community development (RDP, 1994). Wells (1996) suggests that any additional funds to finance conservation and development of protected areas should be sought from public sector funds. When allocating funds to community development themes, this study shows that both residents and community leaders concurred that Job Creation and Housing were the first and second most critical community development themes that should be funded. Both groups agreed that education and Health and Welfare were the other important issues requiring funding following housing. A significant finding in this study is that both groups considered WNR as the fifth most important community development theme and allocated approximately 11% of community development funds to WNR. This was probably due to the notion by both groups that WNR could provide employment and assist with education. Just over half of the residents and about one third of the community leaders felt that employment could be provided with the upgrading of facilities and the removing of invading alien plants. A notable difference between the two groups was that community leaders allocated significantly higher allocations to small business development while residents allocated significantly higher allocations to social development, and felt significantly more strongly than community leaders that WNR would improve the quality of their lives.

Fiallo and Jacobson (1995) indicate that an understanding of the factors that motivate people to support PA conservation is the first step to develop policies for PA conservation. A notable difference was found between the two groups when asked if they were willing to pay from their personal funds to upgrade WNR. That residents were more willing to pay than community leaders is positive for WNR, as residents constitute a greater tax base than a handful of community leaders.

For residents, being aware of WNR, and for community leaders having a tertiary level education, proved to be the important factor in willingness to pay from personal funds.

A significant finding of this study is that the overwhelming majority in both groups supported the retention of WNR as a reserve. This concurs with findings of Khan (1994) for residents and key interested parties of Mitchells Plain to the same question. The inability of residents to take a stance on “Who owns WNR?” and “What do Council officials do in WNR?” again reflects the poor state of communication between WNR management and residents on WNR matters. Residents also had a significantly poorer perception of “how clean” officials kept the area and “preventing hunting” than community leaders. There exists an urgent need to adhere to the lessons learnt from other studies which have shown that information and education programmes in adjacent communities can improve relations (Hamilton and Walters, 2002), and build positive relationships and reduce conflict between communities and PA staff (Hough, 1998; Quingkui, 2003). This should be addressed in the day-to-day implementation of the management plan, in consultation with the community.

The findings of Khan (1994) who previously researched attitudes to WNR suggests that negative attitudes to WNR were the result of ignorance and a lack of information about WNR. Le Maitre et al. (1997) have shown that awareness creation is important in understanding the benefits of Fynbos. Weladji et al. (2003) indicates that education programmes are important to change attitudes to PA's, and considers it a benefit to local communities. A specific project identified in the management plan has been the need to create awareness via appropriate media. The majority of residents preferred television while the majority of community leaders opposed it with opposition mainly coming from those >42 years old. Preference of community leaders for being educated via workshops came only from those in the Health and Welfare sector. The majority in both groups indicated that being educated about WNR's attributes, would make an educational programme worthwhile to go to. The above has shown that embarking on an important project such as awareness creation would need to take the preferences of these two groups into account if it wishes to be successful.

An important finding of this study is that community leaders are more willing than residents to attend a meeting, and become involved in matters, about WNR conservation. That residents prefer educational leaders to represent them, and community leaders prefer political leaders is another important finding. It appears that in future, representation of residents by community leaders would be an important way in which residents participated in WNR management. However, valuable information obtained in this study of the level of agreement or differences would provide an important guide to community leaders in such fora when deciding on

appropriate implementation and adoption of policies for residents for which these policies are intended.

All the findings above have been compared against the existing management plan (City of Cape Town, 2001) in order to arrive at management priorities for the immediate conservation of WNR. The findings suggests that of the 10 management policies in the management plan, the following four should be community-focused and be addressed urgently, with actions rolling out as projects under the relevant policy headings:

(1) Utilization Management

- Upgrade WNR with an accessible information centre as the primary facility. Particular attention should be paid to developing areas for environmental education and community recreation. All upgrading as a form of job creation should be done by local contractors from the Mitchells Plain and Khayelitsha communities.

Timeframe: within the next one year.

- Implement an information and awareness campaign via local media groups in the community about WNR to encourage free visitation, initially for the first year, from when the campaign starts. This campaign should take into account those socio-economic variables which supported WNR conservation objectives.

Timeframe: within the next one year.

- Develop with the community, visitation experiences which results in a well-informed visitor who feels safe, experiences a route not littered with rubbish, has a well trained guide under the watchful eye of visible patrols.

Timeframe: ongoing

- Develop a structured environmental education programme with the inputs of local teachers, education department officials and WNR management.

Timeframe: within the next one year

(2) Management of public consultation and participation

- Develop a co-management model involving WNR management and the community.

This should involve structured, ongoing consultation and involvement of key interested and affected parties in management.

Timeframe: within the next one year

(3) Law Enforcement and safety of users

- Train local people using Department of Labour funding, as patrols to assist the reserve manager with safety of users, as a form of job creation and enhancing community ownership. This should have as its outcome trained and visible law enforcement officers who would be able to run information and education programmes to improve relations with visitors.

Timeframe: within the next one year

(4) Eco-tourism

- Train local people using government funds managed by the Department of Labour, to jointly develop a sustainable eco-tourism plan with WNR management, and enhance community ownership and pride.

Timeframe: within the next 24 months

6.2.2. Responses of the adjacent, culturally different communities to the current and future role of WNR

The research shows that just over half of Tafelsig residents will use WNR over various levels of frequency and none of Harare residents will use WNR in its present non-upgraded state. It suggests that presently, WNR contributes very little and nothing respectively to the socio-economic welfare of Tafelsig and Harare residents. For Tafelsig residents, it contributes to recreation, mainly to enjoy nature. The lack of facilities is the main reason for Tafelsig residents staying away. The reason cited by about half of Tafelsig residents was the threat of crime/gangs. A similar proportion of Harare residents also cited the perception of the threat of crime/gangs as the main reason they stayed away. An important finding is that more affluent residents in Tafelsig, considered comfortable, compared to less affluent residents in Harare, felt that crime was the factor keeping them from using the area. The majority in both groups did not feel strongly that the lack of patrols was a factor keeping them from using WNR. However, that the overwhelming majority in both groups recommended that residents in their communities will visit WNR should patrols be appointed from their communities to combat crime, bodes well for cultivating stewardship and future sustainable use by these communities. The threat of crime to users of nature areas in Cape Town has increasingly been highlighted in the media, not only in WNR prior to this survey (Swartz, 1994), but also recently with attacks in Table Mountain National Park (Bamford, 2005). This phenomenon appears to demotivate users from adjacent communities and would have to be addressed in the management programme of WNR. By involving residents from Tafelsig and Harare in the planning of its management policies and operations, barriers that keep these adjacent residents from using WNR can be addressed. By dealing with issues such as crime, pollution and the

clearing of alien plants (the bush), will improve the aesthetic quality of WNR and feeling of safety of residents.

If upgraded, about 90% in both groups would use the area at least once per month. Findings show that a utilization programme for Tafelsig and Harare residents would work best should it be based on a monthly timetable. In order for WNR to be effectively used by these two groups, staff will have to be increased, be adequately trained in EE and communication skills and be drawn from these adjacent communities in order to accommodate different language, cultural and experiential needs of these two communities. Staff would also have to reflect the cultural diversity to minimize the feelings of discomfort visitors from these adjacent communities would feel if they see few people like themselves amongst staff. Both groups wanted the area kept as a multi-purpose nature reserve, with Tafelsig ranking environmental education (EE) as their priority and Harare ranking Nature Protection as their priority non-consumptive use. Just over half of Tafelsig and Harare residents indicated that facilities created in WNR would primarily benefit them for EE and through employment creation, respectively. The findings that both groups desired to use WNR for non-material uses such as recreation and as a heritage for future generations suggests guidelines should be jointly developed by the adjacent residents with WNR officials to incorporate these non-material uses into the policies of the management plan.

While both groups cited eco-tourism as their primary consumptive use, the choice of a playpark in Tafelsig and an initiation area in Harare highlights these needs and provides a red light to planners and the WNR management to assist in developing these facilities in each community, or face this occurring in WNR. It echoes the growing realization that conservation needs to extend beyond PA boundaries into the surrounding landscape. Findings also indicate that WNR management should take the lead in exploring a sustainable ecotourism use programme which involves residents from Tafelsig and Harare. Such a programme must allow these residents to enter the ecotourism market by small-scaled, locally operated and draw upon the different traditional experiences these adjacent communities can offer.

A revealing difference is that while Harare residents allocated the highest funding to Job creation, Tafelsig residents allocated the most money to Housing. These trends can be understood as the majority of Tafelsig residents had higher incomes and could aspire to housing. The majority of the Harare residents had lower incomes. They were more concerned about finding a better job to improve the quality of their lives. The finding that Tafelsig residents allocated about twice as much funds to WNR than Harare residents suggests that

they saw WNR also helping with other community development themes. This finding is supported by data indicating that Tafelsig residents saw WNR helping with education and placed a greater emphasis on this, while Harare residents saw WNR helping with job creation and other cultural uses such as harvesting herbs for medicines.

A significant finding is that Tafelsig and Harare residents who had lived there longer (residing there >9 years and >6 years, respectively), were more willing to spend community development money on WNR than those who have lived there for a shorter period of time. Unemployed residents in Harare were not willing to pay from personal funds to upgrade WNR. Both groups held the same sentiment that businesses in the local community should also give some money to upgrade WNR. These findings suggest that it is unlikely that residents' personal contributions from these adjacent communities (even user fees) would generate sufficient revenues for WNR. It suggests that funding from these adjacent communities should be sought through ICDPs, possibly through trust funds via conservation NGOs such as Wildlife Conservation Society (WCS) and World Wildlife Fund for Nature (WWF).

An important finding is that the overwhelming majority in both groups supported the retention of WNR as a reserve, and wanted to keep it for the next generation, rather than build facilities on the land. This echoes findings for residents and community leaders in Chapter 5.2 of this study, and findings of Khan (1994) for residents of the broader Mitchells Plain, and are contrary to arguments raised in other studies in community conservation (Oates, 1999; Terborgh et al., 2002), which suggest that poorer communities have little interest in conservation.

Research findings show that Harare residents could not respond to what the management authority did, or how well they did it. However, the majority of Tafelsig residents could respond to what the management authority employees did, and felt that they carried out their functions poorly. The above appears to be due to the differences in information transfer via community newspapers about WNR, with much information being relayed to Tafelsig residents compared to none in Harare. Improved familiarity and contact with nature reserve managers as well as perceived benefits have all been shown to be important factors which influence attitudes positively to the management authority employees (Gillingham and Lee, 1999; Durban and Ralambo, 1994). An important finding was that Tafelsig residents were negative toward and were aware what WNR staff did, had some contact and were previously employed to remove alien plants (i.e. the bush) compared to Harare residents, who did not know what WNR staff did, had no previous contact and were never employed in WNR. It

appears that interactions, services and benefits from WNR were most likely the result of settlement patterns, and indirectly related to cultural differences. It also reflects the differential management planning to involve each culturally different adjacent community by WNR management staff. Findings also show that Tafelsig and Harare residents had different perceptions as to the purpose of WNR staff. Tafelsig residents associated WNR staff with allowing them to benefit from WNR via EE, recreation and tourism, while Harare residents thought that WNR staff regulated the natural resources by protecting wildlife and had the potential to provide them with employment. The relative influence of culture suggests that a community outreach programme should initially focus on a different form of communication with Harare residents, as they have not had any contact with WNR staff to date, and are more likely to want to cut down the bush for subsistence, which makes them a greater ecological threat outside WNR.

Findings of this study clearly show that while getting both groups involved in WNR management will prove challenging but that it would be more difficult in the Harare community. Findings show that by involving residents of each culturally different community in ways which are community-specific, effective and benefits each community, should thus be seen as the first step in gaining their participation and involvement. While both groups had no aversion to being informed about WNR via workshops, Tafelsig residents preferred to be informed via television and wanted to know about WNR's attributes, activities and safety. Harare residents, however, preferred a community meeting called a "kgotla" where the priority would be on discussing employment opportunities and facilities the area offers. The preference of the two groups strongly reflect a more westernised lifestyle for Tafelsig residents compared to a more traditional, African lifestyle (Infield, 1988; Bukle, 1995) favoured by Harare residents.

As both groups live closest, and can be considered the future stewards of WNR, the finding that both groups support the "polluter pays principle" is a major finding in this study. This holds promise for greater co-operation between the management authority employees and residents of Tafelsig and Harare to address the dumping and litter problem in WNR. This study also found that community representation in WNR management should best occur via sectoral representation which involves voices of various stakeholder groups such as women, youth and resource user groups such as craft co-operatives, and not via community leaders, which have been shown to wield too much power in traditional black African communities.

The findings for the closest culturally different communities suggest that a stewardship programme, similar to that conducted by CAPE Nature with local communities in on the

Agulhas Plain, South Africa, would be more effective in allowing the Tafelsig and Harare communities to participate and benefit from WNR. While findings provide an indication of attitudes these adjacent communities, the small sample sizes makes extrapolation of the results to the overall communities difficult. However, the results are exploratory and strongly suggest that these adjacent communities may differ in how and for what purpose WNR should be used. Of particular relevance to these local, culturally different, adjacent communities would be the following four policies, with actions rolling out as projects under the relevant policy headings:

(1) Utilization Management

- Upgrade WNR with particular focus on environmental education and nature protection.
Timeframe: within the next one year
- Employ staff who are skilled in EE and communication to accommodate the increased numbers of visitors expected once WNR is upgraded. Staff should be able to accommodate different language, cultural and experiential needs of these two communities.
Timeframe: ongoing once WNR upgraded
- Develop an EE programme which integrates the needs of both communities in terms of language and culture. For example, Harare residents should understand why the area is not suitable for initiation practices. This could entail one day sensitivity activities with neighbouring communities facilitated by a black NGO to promote an open and receptive state of mind towards WNR. Guided tours for adults, youth and the aged to show the natural, cultural and historic values of WNR. Blanco (2002) has shown that such EE programmes in the Macarao National Park in Venezuela have achieved several goals, including: better relations between the local authority and the community; involvement of the community in protection and conservation of the area; and the use of the PA in local schools. In the Henri Pittier National Park, the development of “An ideas for Action” programme has resulted in five projects that have strengthened community organization of adjacent communities, especially in their schools (Blanco, 2002).
Timeframe: within the next one year

(2) Management of public consultation and participation

- Develop a stewardship programme with both adjacent communities, which involves a strong neighbour-relations component. This should involve capacity building followed by participation of residents of both these communities on the management structure.
Timeframe: within the next one year

- Review the policy on recreation and sustainable resource utilization and especially work out a system for wildflower harvesting for traditional medicines.

Timeframe: within the next one year

- Develop with representatives from both communities, appropriate measures (e.g. fines) to combat litter and dumping.

Timeframe: within the next one year

- Develop a funding proposal with the participation of both adjacent communities to conservation NGOs such as WCS and WWF to fund the development and management of WNR

Timeframe: within the next one year

(3) Law Enforcement and safety of users

- Train and later employ local volunteers from Tafelsig and Harare as patrols to assist the reserve manager. Their work should involve safety inside WNR, combating pollution as well as advocacy in their own communities.

Timeframe: within the next one year

(4) Eco-tourism

- Employ and train people from these immediately, adjacent communities and involve them in developing a sustainable eco-tourism policy with WNR management. Such a policy should ensure that tourism is small-scale, locally-operated and provides different traditional experiences. Operators should share the costs and benefits of environmental services. It should draw on lessons for PAs in California, U.S.A. (e.g. see de Los Monteros, 2005).

Timeframe: within the next 24 months.

6.2.3. Responses of four user groups relating to their usage, preferences, perceptions and knowledge of WNR

According to Phillips and Gentry (1993) inputs from users are important in designing management plans for PA's. Many other authors concur that understanding usage, preferences and the factors influencing usage are essential to drawing up long-term, sustainable management plans (for example Murphree 1991, Heinen 1996, Sah and Heinen 2001). Research in this study involved four user groups; fisherfolk, teachers, primary and secondary pupils. Key findings relating to the key questions are provided below.

In as far as usage is concerned, respondents in all user groups use WNR at least once per year. Fisherfolk are the greatest users, use the area most often and have been visiting WNR for a significantly longer period than each of the other three groups. Primary school pupils followed by teachers are the second and third greatest user group, respectively, followed by secondary school pupils. Fisherfolk use WNR primarily for fishing, especially in Summer (November – February). An important finding was that the majority of fisherfolk did not support the need for a permit to fish, especially those who have been coming to WNR for >10 years and whose educational level is above Grade 12. The management plan does not adequately address sustainable fishing under its resource utilization policy and this needs to be addressed in consultation with fisherfolk. Educational users use WNR for environmental education, especially in Spring (September to November). Relaxation was the second choice for the majority of fisherfolk, teachers and secondary pupils. Just over half of primary pupils cited birdwatching as their second choice. Fisherfolk ranked a parking area as the primary facility they desired while the majority of educational users ranked an enviro/information centre as the primary facility they desired. All groups indicated that the primary drawback outside WNR was the lack of information. Fisherfolk and teachers ranked safety as the primary drawback to be improved, while secondary pupils cited “the lack of guides” and primary pupils cited pollution, as the primary drawback that needed to be improved in order to make their visit enjoyable.

Currently, about half of the teacher respondents use WNR in five learning areas, mainly in the Science and Technology learning area. An important finding is that 92% of teachers lack the abilities to develop educational resources, especially preferred information packs. This is important as the new curriculum, Curriculum 2005, expects teachers themselves “to facilitate the development of relevant and effective learning materials” (Department of Education 1997a). The average number of 17 pupils/ teacher that teachers indicated that they would take to WNR is lower than the 25 pupils/ teacher indicated in the management plan. The plan further indicates that school parties are limited to 80 children and should only be confined to certain paths or allowed to clear pollution or alien vegetation plots.

The majority of primary and secondary pupils preferred subjects in the Biological Sciences to be taught in WNR with information and resources preferably being held in local libraries.

The findings in this study indicate that these four user groups were not directly involved in the policy development process and that further opportunities should be arranged for users to engage with and provide inputs into the management policies. Furthermore, teachers would have to be assisted by persons knowledgeable about WNR and educational curricula, in

developing learning resource materials, if real environmental education is to take place in WNR.

With regard to a cost-effective interpretation programme, research indicates that a core set of resources and focused visitation programmes need to be developed for adult and pupil groups. A general information pamphlet should be developed for all groups. Fisherfolk and teachers prefer guided talks paid for by the local authority, about a third of primary and about half of secondary pupils prefer environmental education activity sheets. About a third of primary pupils preferred the identification of areas for discovery learning. As to how information should be developed, the majority of fisherfolk preferred mostly pictures with a few facts, teachers were ambivalent, the majority of secondary pupils preferred detailed facts with pictures and the majority of primary pupils preferred their information in story format with pictures. These findings suggest that the interpretation and visitation programmes would require ongoing assessment by both WNR managers and users.

An important finding was that the majority in each group wanted land-use in WNR to remain multi-purpose but with a focus on non-consumptive uses. This seems contrary to another important finding that half of the fisherfolk group, who reside in Mitchells Plain, and 60% of primary pupils living <1 km from WNR, wanted some of WNR to be used in a consumptive manner, i.e. a playpark (fisherfolk wanting their families to accompany them). Furthermore, 70% primary pupils wanted the area for a camp site, which only accommodated scholars for educational camps. It appears that the management plan will need to be revisited in order to accommodate these users in order for it to demonstrate that it can benefit users in the way they see sustainable land use.

With regard to its perceived value, fisherfolk ranked the primary value of WNR as being “the only nature reserve in Mitchells Plain”. This, together with the finding that drew the most overall support “it forms part of our history”, could form important slogans in communication campaigns to build support to conserve WNR. The greatest perceived threats to using WNR by each group are: crime (fisherfolk), the thick bush (teachers and primary pupils) and rubbish dumping (secondary pupils). Different socio-economic variables contributed to why each user group perceived these issues as a threat to them using WNR. In summary, fisherfolk living in Mitchells Plain feel more threatened by the thick bush than those living outside Mitchells Plain. Teachers older than 35 with a degree or diploma feel more threatened by the thick bush than those younger than 35. Female teachers feel more threatened by crime than male teachers. Secondary pupils over 15 years feel more threatened by the thick bush and dumping than those <15 years old. Primary pupils living <1 km from WNR feel that rubbish

dumping is a threat compared to those living >1 km away from WNR, who feel that rubbish dumping is not a threat.

The finding that about one third of fisherfolk and about half of educational users did not know what the term conservation meant, and that about half of all user groups held protectionist or preservationist notions of conservation is cause for concern. This suggests that adult and formal school education programmes urgently need to be developed and communication via the national media, (e.g. on television programmes such as 50/50), should be enhanced, in order to carry over the true meaning of conservation as espoused in The World Conservation Strategy (I.U.C.N., 1980). Picard (2003) warns that if this is not done, tensions will deepen between users and PAs, while Cock and Fig (2000) indicates that conservation will continue to be associated with dispossession and the apartheid policies of the past government.

Another important finding is that all user groups had very low flora and faunal knowledge scores. While wildlife knowledge is considered important in support for conservation (Kellert 1996), baseline information as gained through this study can determine the characteristics of biodiversity education programmes (Nyhus et al., 2003). Findings of this study suggest that user-specific programmes should be developed for each user category. Education programmes should focus on the flora at genus level where easy comparison could be made with common names and focus on the fauna at family level for educational users and at genus level for fisherfolk. Lessons from educational programmes conducted in national parks in Venezuela (Blanco, 2002) could be applied in WNR to increase environmental learning. In a course run over two weeks involving one and a half hour classes, hunters were taught using a method of a study guide, slides and a poster. A knowledge test and an opinion survey were conducted in a pre-test and a post-test. The majority (93%) passed and was satisfied with the methodology (91%). Such a methodology could prove useful in increasing knowledge of users about plants and animals in WNR. It may also become a standard in other lowland fynbos PAs for improving knowledge of plants and animals. Findings in this study also suggest that increased usage and interactions with WNR and its biodiversity will improve knowledge of plants and animals, and lead to increased support for their conservation.

Management recommendations for the user groups are as follows:

(1) Utilization Management

- Develop desired facilities such as a parking area for fisherfolk and an enviro/information centre for educational users.

- Address drawbacks identified by each user group and provide additional security during times of greatest usage.
- Develop a marine PA plan with fisherfolk. This should address sustainable fishing practices under its resource utilization policy in consultation with fisherfolk.
- Provide teachers with support to develop educational resources, especially preferred information packs. Improve support to teachers when visiting WNR to ensure a low number pupils/educator ratio for effective learning to take place, even if via local NGO's such as "The Friends of WNR" group.
- Ensure that information and resources on WNR is held in all local libraries
- Develop a cost-effective, user-specific interpretation programme, each backed by relevant and appropriate resources.
- Promote the value of WNR via an innovative communication programme in consultation with users.
- Increase knowledge of flora and fauna for each user group by developing methods to increase knowledge and increasing usage by the same persons over multiple visits

Timeframe for all of the above: within the next one year

6.2.4. Responses of teachers to utilizing the WNR for environmental education

The main finding of this study is that teachers use WNR because they recognize that one of its many attributes is that it has educational value as a resource for their activities. They indicated that the use of the resource required an annual plan, co-ordinated at district level between three key stakeholders namely; teachers, educational and WNR managers. Another key finding is that the main challenge to teachers who wanted to use WNR was the provision of INSET. The other four contextual and logistical challenges identified also need to be addressed in order to implement EE relating to WNR. These findings concur with those of Schreuder (1995) who identified that teachers rely on fundamental pedagogics and find it difficult to adopt a socially-responsive research orientation in their practice. Such an orientation would support community conservation. This he ascribes to poor or non-existent INSET programmes of the Educational Department to support such innovations, and concurs with Hatsthorpe (1985) in this regard. While teachers in this study called for an INSET policy at district level to use WNR, Wagiet (1996) indicates that no generic policies existed at the time for teacher education, and that education department officials merely disseminated syllabus change and technical approaches to teaching.

An important finding was that implementation challenges were overcome in cases where teachers of the same school worked together, as a team with support from their senior

management. Working collaboratively with teachers of another school who formed part of the WNR teachers' forum also assisted teachers in overcoming implementation challenges.

When implementing the use of WNR in their classrooms after the workshop programme ended, teachers who wanted to use WNR to follow the Outcomes Based Education (OBE) curriculum found that the INSET programmes provided by the education department officials were not satisfactory. This situation was also reported by Reddy (2001) and Pithouse (2001) in Western Cape and KZN schools, respectively. The INSET programmes were "not enough to capacitate teachers to use WNR in OBE" (Curriculum Advisor interview, see Chapter 5.5, section 3.3.3.1) as it was based on a five-day programme, which did nothing but familiarize teachers with complex jargon (Lotz and Oliver, 1998). Bagwandeen and Louw (1993) refers to this as a "deficit model" of INSET, which assumes that teachers are deficient and that their practice can be corrected by simplistic INSET processes.

Another important finding is that processes of curriculum and curriculum resource materials development followed in this study reflected elements of what Bagwandeen and Louw (1993) refers to as the "growth model" of INSET. This allowed teachers to participate in curriculum development by "writing their own curriculum content" as well as to participate in curriculum resource development by "developing their own litter data sheets during workshops, and testing these in order to implement the issue-based approach over the term." Teachers indicated that "We now have a full set of resources to do this (pollution) learning programme". These findings suggest that the growth model of INSET was more prevalent in the WNR INSET process, and would be more suited to any future INSET programme on WNR, as its main aim is to familiarize teachers with developments in the educational field and enable their continuous professional development.

An important finding is that teacher development appeared largely successful over the workshop and follow-up period of this study as teachers indicated that: they felt empowered as workshops were collectively planned and ran over a long period; they were consulted as to the content and process of workshops; they felt supported when using WNR as well as when implementing learning programmes back at their schools (by the researcher, their colleagues and school management); their work was appreciated when they were evaluated by the researcher. These Fullan (1991) sees as crucial to the success of teacher professional development programmes, and different to that experienced by teachers attending official INSET programmes of the Education Department (Lotz and Oliver, 1998).

Findings also show that many teachers did support using WNR to do issue-based, thematic teaching in the workshops and in periods between workshops. Later, when needing to use WNR in an OBE framework, they found it difficult to align it to the OBE outcomes. The teachers who experienced professional uncertainty when needing to use WNR in an OBE framework showed resistance which suggest that it could have been due to these teachers being part of education courses prior to 1994 based on the philosophy of Fundamental Pedagogics, which intended that teachers implement curricula without question (Enslin, 1990). This phenomenon was also found by Reddy (2001) in Cape Flats teachers of the Western Cape province. His study also showed that a small number of teachers support using WNR in an OBE framework but that personal motivation, flexibility, availability of resources and supportive school contexts are important factors which lead to their support. Another small number showed compliance, displaying “false clarity” (Fullan, 1991) in order to implement this change as painlessly as possible. Micropolitical issues at schools such as power relations of senior staff, who insisted on implementing easier, non-relevant examples, acted as a constraining factor to implementing the use of WNR in OBE.

Ecological tools identified by teachers to respond to the main threats in WNR were the pollution audit and alien vegetation audit kits and learning programmes. Although this was later re-evaluated by the Working for Water Programme in 2002, the procedures and data sheets were based on work compiled by teachers in this study.

In identifying how sustainable educational use of WNR by teachers of local schools could take place within the overall management programme of WNR, five key elements have been identified that would contribute to the development of a successful EE programme for WNR under the utilization management policy:

(1) Utilization Management

- Develop an annual plan of operations (APO) which is adequately funded and co-ordinated at district level between stakeholders namely; teachers, educational, WNR managers and educational NGO's.

Timeframe: within the next one year.

- Address the development of certain sites and paths in WNR, which should be used for active learning programmes.

Timeframe: within the next two years.

- Address the seven greatest challenges affecting the use of WNR for EE.

Timeframe: within the next one year.

- Develop a long-term INSET programme for teachers based on Bagwande and Louw's (1993) "growth model" of INSET. Education department curriculum advisors are to be integrally involved. In this INSET programme, workshops need to be collectively planned to address teacher knowledge and skills, and run over a long period. Developing teachers' skills to engage pupils successfully in pre-and-post excursion activities during active learning exercises should be an important component of an INSET programme. The importance of peer training where skilled teachers act as key INSET providers should also form part of this programme. Teachers should be consulted throughout the programme, supported during implementation, their work evaluated, and programmes of certification organized. This would improve teacher confidence and result in them using WNR even more. Teachers need to acquire a deep understanding of change in order to implement the new OBE policy. They should also develop as critically reflexive practitioners who can respond to policy, develop competencies for using WNR through explicit modeling and experiential learning, and act as agents of change in their schools (Wilmot, 2004).

Timeframe: within the next one year.

- Develop whole-school based programmes where the use of WNR in an OBE framework occurs across a phase of learning. For example, in the senior-primary phase. Such programmes should start off in the three key learning areas of Science, Human and Social Science and Mathematics. A pre-requisite is that school management must support such programmes. This should involve regular follow-up support to these small groups. This should start with a small group of five lead schools. Teachers should be selected who are personally motivated, flexible, are willing to develop/ co-develop curriculum-aligned resources and have supportive school contexts. These lead schools could be used to initially demonstrate the successful use of WNR in an OBE framework, and lessons learnt could be used in the following years' teacher INSET programme. A WNR-school-university partnership would be advisable for this process. Timeframe: within the next year

6.3. Implications for community participation in biodiversity conservation and reserve management

The traditional manner in which communities have participated in lowland fynbos PA conservation was when conservation officials engaged them in workshops. At these gatherings, the idea of nature was infused into participants, with the understanding that they would return home and change their attitudes and behaviour towards PAs. It has become clear in poor communities all over the world e.g. in India (Uniyal and Zacharias, 2001), that such approaches will not yield any real benefits. These will also not be meaningful, especially in developing contexts such as on the Cape Flats. Responses of all community user groups in

this project have shown that the most effectively way to ensure involvement and participation in the conservation of WNR is to:

- create the institutional environments (Geoghegan and Renard, 2002) for managing the area;
- develop the physical facilities for using the area;
- allow use of the area in the manner identified by the diverse users, and in a way that is primarily non-consumptive, fits into community agendas, and retains the ecological integrity of the area. Geoghegan and Renard (2002) indicate that conservation management must take into account the full diversity of users and the manner in which they are impacted by, and impact upon the PA;
- target those individuals in the community who are positively inclined towards WNR and increase their usage and interactions with WNR;
- ensure the area is funded sustainably and forms part of local development themes. Barrow and Fabricius (2002) indicate that PA benefits must exceed costs to local communities for community participation in PA management to be meaningful, especially in developing countries. Benefits should include intangibles, which are often underestimated (Ashley, 1998; in Barrow and Fabricius, 2002);
- ensure that community education involves awareness via appropriate media. A user-specific model for interpretation is best. It should take into account what each user group requires rather than applying models of developed countries. In these models, training materials are generalized and merely translated to fit local conditions (Ham et al.; 1993)
- ensure appropriate, ongoing interaction between reserve management and the community. Barrow and Fabricius (2002) indicate that there is a direct correlation between the commitment of park managers to the participation of local communities and the success of community conservation.

The results of the community surveys have also suggested that participation in WNR management in the future would be more effective via the representation of community leaders who represent local organisations. However, an important pre-requisite would be to strengthen the capacity of community leaders regarding their knowledge of the PA and understanding the diversity of stakeholder interest and views (MacKinnon, et al., 1986; Geoghegan and Renard, 2002). This approach of participation of local community leadership in conservation management has been found to be successful in both North America and Canada (Mitchell et al., 2002). This holds great promise in both the Mitchells Plain and Khayelitsha communities as it would allow easier integration of WNR on the local development agenda of the area.

6.4. Implications for the work of the Cape Flats Nature (CFN) project

Since its inception in 2002, the main goal of the CFN project has been to establish a basis for an approach that integrates social aspects into biodiversity conservation policies and practice in an urban setting. It has played a facilitative role, together with the local authority which manages WNR, in determining the best future management approach. Taking findings of this project together with the evaluation report (Soal and van Blerk, 2005), as well as supporting literature on other urban PA sites, implications for the ongoing work of CFN is discussed. This is done at a time when it is possible to re-shape the CFN project (Soal and van Blerk, 2005).

While the CFN project strives to intervene “into the mindsets of those living around lowland PAs,” the project is now able to draw on the findings of the studies undertaken in this project which provides an insight into the responses of different user groups to the conservation and management of WNR. Findings of this project are now briefly discussed in the context of the four critical areas of practice that emerged out of the evaluation of the work of the CFN project.

In improving its partnership and conservation practice, it is clear that CFN has to facilitate an institution-building process with the local authority. The latter has yet to accept full management responsibility to execute biodiversity management of these urban sites, politically and practically, in a manner that works with the people, and in a way that provides benefits primarily for people surrounding these sites. Given the responses of user groups in the surveys (Chapters 5.2, 5.3, 5.4, 5.5), CFN would also have to secure “buy-in” from the relevant environmental manager at the City of Cape Town, “community buy-in” with users in the local community, and particularly with community leaders, where many are active as local councillors who are able to influence decisions at local authority level.

In improving its social practice in the work it does with communities, CFN will have to embark on focused programmes given its severe staff shortage (one manager and two conservators). I will now suggest four key areas which have been identified in this research project. Firstly, responses of different user groups in this project have shown that CFN will have to facilitate the development of site-specific usage programmes for each site. Because WNR is freely accessible, once developed, one of the major challenges of the user programme at WNR would be to manage informal use of the Mitchells Plain population alone, which currently stands at 350 000. Together with visitors from other Cape Town suburbs, which has exceeded 4 million, and is expected to attain 6 million by 2020 (McNeely, 2001), it would

pose a considerable challenge for the management of WNR. It is likely that tourism pressure would also increase, given WNR's attributes. Another tourist attraction in False Bay, The Boulders Penguin Colony, attracted 400 000 visitors in 2001 (McNeely, 2001).

The second area would be to develop a focused, well-planned public contact programme in partnership with community organizations. Such a programme would use a variety of strategies to create a sympathetic and environmentally aware public and meet specific management-related objectives (Hockings et al., 1998). Findings of this study regarding communication suggest that CFN would have to assist WNR management to reach different community user groups. The approach of "going to people where they are" has been shown to be successful, particularly when engaging schools, not only in this study, but also in studies to get teachers involved in developing school curricula (Reddy, 2001). Findings relating to the teachers responses to utilizing WNR would assist in understanding why and how teachers use WNR, and challenges affecting future use of WNR. As with WNR (248 ha), education has also been prioritized as the primary use for similar-sized, small urban PAs such as Costanera Sur Natural Park in Buenos Aires, Argentina (320 ha) and the Yatsu-Higata wetland reserve in Tokyo, Japan (40 ha) (Phillips and Gay, 2001). As with WNR, these areas were also underdeveloped and are now highly contested for alternative land uses. The assistance of schools by conservators and friends groups in conducting ongoing monitoring of pollution and alien infestation using audit tools developed by teachers, would greatly enhance the image of conservators. This kind of monitoring has also been done in Lane Park urban reserve in Sydney, Australia (Brown, 2001).

The third area of practice is to improve its internal practice. In needing to develop good practice, CFN falls short in that it cannot meet its ideal of changing attitudes of whole communities. This is because it has no real data on the attitudes of communities surrounding these sites. Methodologies as employed in this research project need to be applied to other sites in order to first gain an understanding of how communities view the benefits from these sites. In this regard, findings of this study provide a basis on which to address attitudes at one site, namely the WNR. As mentioned previously, approaches are site-specific, and thus community-specific.

The fourth area of practice is to improve relationships between the WNR management staff and the surrounding communities. This is to be done not only with the local management authority, but also with its community partners, such as community organisations. This has been a difficult area as managers of the local authority have changed often, administration is fragmented, and tensions within community organizations are common. These will only

increase as WNR becomes more attractive as a potential income generator for the community. Such difficulties have also been found by Barrow and Fabricius (2002), when investigating community conservation issues in rural eastern and southern Africa. A key finding of this study, which should be kept in mind by CFN, is that inputs into reserve management should be provided by different user groups, other representative community stakeholder groups such as business leaders, youth groups, women's groups, and not by community organizations alone.

The findings in this project suggest that community participation in biodiversity conservation of lowland PAs would be best via a site-specific model approach. Future planning should be based on an integrated approach which involves social inputs (as provided by this research project) as well the environmental management plan as basis. Broader thinking around community participation is thus required to make it more meaningful for communities surrounding these sites. This site-specific model would have as its main aim to consult user communities on the appropriate use of these areas, initiate small, specific actions which fit with agendas set by these communities, keep these actions within the critical realm of biodiversity conservation, build honest partnerships with a cross section of stakeholders from national, provincial and local governments, NGO's and community-based organizations, and build local leadership from within local communities (Davis, 2005). Lowland fynbos managers should take the lead to ensure ongoing awareness and education programmes about the areas. This approach would be more suited and met with more success. It would also be sustainable and would favour ongoing participation of local communities.

6.5. Implications for local educational policies and practices related to lowland fynbos reserves

Findings in the study on teachers using WNR for environmental education (EE) have shown that the development of a local policy on using WNR must be preceded by the adoption of a tripartite management arrangement between education and WNR managers and teachers. This arrangement should be supported by partnerships with external bodies such as educational NGO's and local universities. WNR managers should take the lead to register WNR as an educational resource that could be used for OBE. The policy at the local Educational Management and Development Centre (EMDC) is that specific curriculum advisors, e.g. in the Science Learning Area, of the Senior Primary Phase of Learning, would then facilitate the process to use WNR in the OBE curriculum. Through an INSET programme as described in section 6.2.4 of this chapter, curriculum advisors could champion the process forward and facilitate learning programmes, lesson plans and learning support materials on WNR which are aligned to the OBE curriculum. Through starting with a small group of teachers at a few

schools, quarterly and annual evaluation would lead to modeling of the process through experiential learning. Via a process of implementation-based learning, sustainable local educational policies could be shaped by teachers-in-action.

An important pre-requisite for the development of policies and practices for using WNR for EE, and in other lowland fynbos reserves, is that an EE body is formed comprising education and WNR managers, teachers and external education bodies affiliated with lowland fynbos conservation. They should direct the development of areas such as WNR for educational use, and ensure that any policy decisions are compatible with the educational implementation via the EMDC. In the utilization policy related to the use of WNR by teachers, this body should ensure that teachers have a rationale to use WNR and understand why WNR is appropriate as an educational resource for use in their curricula, and as an important learning environment (Simmons, 1998). WNR managers, WNR environmental educator or guides should ensure that the way different settings in WNR is introduced to teachers provides the necessary imagery that results in the maximum number of educational activities being identified by teachers (Simmons, 1996). By utilizing more settings, EE in WNR is likely to be integrated into more learning areas, and thus more teachers would want to use WNR. Lessons learnt from the University and Park project as developed in the National Park system in Venezuela (Blanco, 2002) which resulted in application of EE across more learning areas, development of sensitivity programmes for local schools, teachers INSET workshops and an education plan for a PA, could be applied in WNR, as well as other lowland fynbos PAs. It is clear that the EE goals set by teachers are compatible with the management goals of WNR.

This study has shown that an EE plan for different community user groups must form part of the utilization policy of WNR. The responsibility of this plan must be that of the WNR manager who should have a strong background in EE. The utilization policy must provide for an information and communication component that will allow for the development of a database which outlines the characteristics of users, visitors and principal environmental problems of WNR. The public consultation and participation policy must strengthen information dissemination through mechanisms identified for different user groups in this project. This would open participation channels for the ongoing participation of these groups into WNR management. Ongoing evaluation of participation would ensure that community user groups remain involved in WNR management.

The public consultation and participation policy must also ensure that adequate human and financial resources are secured to ensure the ongoing use of WNR. Developing a volunteer database from the local community and NGO's could assist with meeting the usage needs of

visitors to WNR. This strategy has been shown to be successful in other urban PAs in Brazil, Australia and Argentina (Trzyna, 2005). The creation of a financial trust fund with inputs from the local authority, local government, private philanthropy, fee-for-services approaches such as from filming in WNR, as well as business and programme partnerships would be important for the sustainable financial functioning of WNR. These creative financing approaches have been shown to be successful in the urban PA of Golden Gate Biosphere Reserve in California, U.S.A. (Trzyna, 2005).

6.6. Concluding comments

Through this multidisciplinary research project, participation in the conservation of WNR was explored from different community groups' perspectives, each within its own context. The overriding impression that this survey has demonstrated is that the past exclusionary practices in lowland fynbos areas, such as in WNR, are being replaced by participation of local people in the planning of the area. This has clearly shown that the next step is for local people to be integrally involved in the management of the area. By feeding the findings (knowledge) back into WNR's policies (see above) as encompassed in its management plan, it has demonstrated that the community can be involved in a community conservation programme involving collaborative management. By using this approach, the findings of this project has shown that conservation objectives can be linked to significant local development needs, such as job creation and environmental education (Barrow and Murphree 2001).

There appears to be general consensus amongst users that in its current non-upgraded state, there will be low levels and frequency of use, exacerbated primarily by factors such as crime, the thick bush and pollution. Upgrading of the area will see significant increase in levels and frequency of use and should start with the construction of an environmental/ information centre for residents, teachers and pupils and a parking area, specifically for fisherfolk. Findings also show that while the area would not be able to contribute on a massive scale to local livelihoods, and would not be able to demonstrate a huge income from eco-tourism, its greatest value lies in its ability to be used in a non-consumptive manner as an environmental education resource for the local community and for local schools. Support for this will have to be more deeply entrenched in different community user groups via relevant media, visitation programmes, experiential interpretation exercises and learning support materials which are appropriate to each user group. Media campaigns should pay particular attention to (a) creating awareness to counter negative perceptions and highlight aspects of the area which attracts users, such as its attributes, and (b) the particular socio-economic variables such education and age, for example, in order to first target these individuals who are positively motivated towards WNR conservation (Fiallo and Jacobson, 1995).

WNR development and its funding should in the future be viewed as an integral part of community development. This would allow decision-makers to link WNR objectives to local development needs (Stocking and Perkin 1992), such as the need for an outdoor educational laboratory.

That residents were more willing to fund WNR from personal funds than community leaders suggests that common ground will have to be found between the community's perception of using WNR to achieve community development goals such job creation and education, with the goals of local business. Mechanisms such as ICDP's will have to be sought to show that both groups can benefit. Significant support in funding allocation to WNR as a community development theme also shows that WNR conservation should in the future be formally recognized through policies and strategies such as the local authority's Urban Renewal Programme, as one of the community development themes in Mitchells Plain and Khayelitsha.

There exists an urgent need to formalize a neighbour-relations programme managed by an institutional structure comprising both local community and WNR management representatives. Community leaders have a crucial role to play in this regard. This would ensure the ongoing release of positive information, build adult education programmes that can improve relations, build positive neighbour relationships and reduce conflict between communities and WNR staff.

The manner in which local schools have been using WNR up to now is not sustainable, as it is unstructured and not officially supported by both education and WNR management. For local schools to benefit from using WNR, teachers will have to be professionally developed through an INSET programme which forms part of educational policy at district level. This will demand an investment of time, money and will on the part of educational and reserve managers, as well as commitment from participating teachers and their schools. This programme should not be technocratically constructed, a sort of "one size fits all" (Hargreaves and Fullan 1992), but take account of their contexts and involve the participation of teachers in its planning, content selection and satisfy their sense of purpose i.e. why they are motivated to do what they do. These programmes should be extended beyond workshops to providing support to small groups of teachers at different schools as well as when learning is implemented in WNR.

The future sustainable use of WNR which is largely based on its use by the local communities and user groups identified in this research project clearly shows that these user groups would

have to remain involved in any future review of its management policies, strategies and actions and that future management programmes must meet the needs of local communities in their contexts. This is particularly important for all communities adjacent to lowland fynbos protected areas, where apartheid policies have shaped their attitudes to these PA's in the past.

6.7. Possibilities for further research

This project has explored responses of particular socio-economic community user groups to biodiversity conservation of WNR, a 248 ha urban nature reserve on the Cape Flats, where few highly threatened species occur. While this study has been done over a certain period of time in a particular context, it cannot make any conclusive claims about the responses of local communities living adjacent to the other 37 core lowland fynbos conservation areas on the Cape Flats. Other research is therefore suggested which could help to develop a more comprehensive picture of local community responses to biodiversity conservation of lowland fynbos. These could include a comparative study of communities of differing socio-economic levels adjacent to a fynbos PA, such as the Kenilworth racecourse, to the conservation of this highly threatened lowland fynbos. Such studies could provide valuable knowledge about comparative community attitudes to fynbos conservation, following ten years of democracy in South Africa.

With regard to funding, an area that will require urgent investigation is how these PAs could form part of, and respond to local community development. Local sustainable solutions need to be found in order for these areas not to be dependant on external international funding for their survival, but be able to contribute to local economic development via education and tourism.

It appears from other lowland initiatives such as with the Edith Stevens Nature Reserve on the Cape Flats (Davis 2003), that conservation involving local communities is site-specific. An area requiring investigation is the development of protocols and procedures for involving local communities in developing neighbour-relations programmes. Research should also focus on identifying the particular socio-economic variables which leads to support for conservation of those particular areas. Media campaigns based on this research would lead to more targeted support from positively disposed community members.

While findings in the adjacent communities study (Chapter 5.3) have shown that the kind of community outreach into Tafelsig and Harare can shape attitudes to WNR conservation, relating such outreach to behavioural changes in resource use through attitudinal assessment will be a challenge that will require an understanding of the relative influence of various

social, cultural and economic factors. Thus, a study to understand the circumstances under which attitudes accurately reflect behaviour will be necessary if attitudes are to be used effectively in management planning.

Another area that requires urgent attention is to research the non-material values such as cultural and spiritual values lowland fynbos sites hold for communities, and how these can be integrated into management protocols for these areas. This has been successfully investigated in other PAs in Asia (Hamilton, 2000) and North America (Bernbaum, 2000; Tranel, 2000).

An ecotourism study needs to be undertaken which has the participation of the local adjacent communities of Tafelsig and Harare as its cornerstone. Goals for such a study would be to identify the local conditions and policies that would shape the success of ecotourism at WNR, similar to that determined by Archabald and Naughton-Treves (2001) for communities adjacent to three national parks in Western Uganda. For WNR, this would include determining the following key components which are required, namely: the long-term institutional support; transparency and accountability; the development and implementation of programmes with regard to safety, infrastructure and access, marketing and communications; appropriate identification of the benefiting communities and project types; the extent to which ecotourism should be small-scale and locally operated; how leakages could be minimized; which goods and services could be supplied by residents in each community; which traditional experiences are available or can be developed; what would be the core elements of an ecotourism policy that would share the costs and benefits of environmental services; should there be a tourism revenue sharing (TRS) and who should receive tourist revenue, and how should this revenue be disbursed; and the sectors best suited to be involved in an ecotourism initiative. Archabald and Naughton-Treves (2001) have found that between 1995 and 1998, communities around these three parks in Western Uganda used a total of U.S.\$83 000 of tourist revenue to build 21 schools, four clinics, one bridge and one road.

As for teachers in formal education, many teachers in the WNR project who were senior teachers (Head of Departments-HOD) were also involved in environmental education initiatives outside schools and conceptualized curriculum differently. They felt that they were good teachers who displayed “professional certainty” (Roberts, 1997) and felt they had the experience to use WNR. Studies similar to Roberts (1997) who investigated teachers professional constraints, challenges and choices when reconstructing the National Curriculum in England can be carried out in order to identify how, by using WNR, teachers conceptualize the curriculum. An area which would require focused attention would be how to maximize INSET programmes for schools who would use WNR in future, as well as for schools

adjacent to other lowland fynbos PAs. This would not only address essential teacher professional development, but also be the key to the environmental education programme component of management plans for such PAs.

6.8. Reflections on the research process

In this research project I followed a quantitative-qualitative research methodology in order to gain an understanding the responses of a randomly-selected cross-section of the neighbouring community, the nearest adjacent communities who were of different cultural origins, and willing users and teachers, each in their own context. Except for the teachers in the last study, a quantitative approach was deemed appropriate for the survey of the communities as I could gain insights and be able to describe their responses as to how and to what extent they would use WNR in its present and an upgraded state, challenges and factors affecting its use, threats to its use, its perceived value and user knowledge of its floral and faunal attributes. The study on the responses of teachers was more in-depth, following a qualitative methodology where I used an action-research approach to engage teachers in a workshop programme and a more interpretive approach to understanding how, and what challenges teachers were experiencing in implementing their learnings of the workshops back in their classrooms at school and when they used WNR, after the workshop programme. It also allowed me to gain an understanding of how teachers were implementing innovations in using WNR in a period of educational and broader social change after the demise of apartheid in South Africa. Despite my efforts at providing a comprehensive picture of use by the main user groups, I would also like to reflect on perceived limitations and value of the research process, which I discuss next.

6.8.1. Limitations of the research

This I will discuss on an individual study basis. In the broader community study in Mitchells Plain, despite initially wanting to interview 400 residents, the need to randomly select a representative sample per suburb, time required to locate the exact address, locate the correct respondent, the constraint of only being able to interview a certain number of respondents per day, still leave the area safely, together with the financial constraints to interview a limited amount of respondents, made it possible to only interview 200 residents.

In the adjacent community study, the small number of respondents I was able to access in Tafelsig and Harare was another limitation, but this was due to time as well as my concern for personal safety in spending an extended time in these unfamiliar areas. This small number of respondents for each community meant that these were not large enough to be representative of the populations I wanted to extrapolate to. The findings however, were exploratory, not generalizable to each community, but suggested that there were strong indications that these

communities may differ with regard to how, how often and for which purpose they wanted to use WNR.

In the user study, I was limited to fisherfolk who I met in situ. As such, I was only able to interview them while they were fishing and only for a limited time during the day. It is well known that quite a number use the area during the night. The survey is thus only representative of day fisherfolk. Educational users were limited to teachers and pupils who had previously visited WNR. It would have been valuable to also hear the perceptions of teachers and pupils who had not visited WNR before in order to develop a management strategy that would address their concerns.

In the teacher study, although I started off with a large representative number of teachers, the small number of teachers who I was able to access during the latter part of the workshop programme, the reflection phase after the workshops and much later to enquire about implementing WNR in their practice, reflects the ongoing demands experienced by both teachers and myself. It would also have been of great value if I could have interviewed more curriculum advisors of more learning areas, especially to hear how they saw the use of WNR as an educational resource and the approaches to INSET in order to use WNR on a sustainable basis in the future.

Another limitation I perceive is that the findings of this research project are only valid in the context of Mitchells Plain, Harare in Khayelitsha, users and teachers surveyed in this project. However, this provided the most practical and representative assessment of known users of WNR. It is known that a small number of persons harvest herbs and pick flowers in WNR. However, although I did find two persons who harvested and sold WNR herbs at the local market, I could not locate any other persons in order to consider them a user group.

6.8.2. Value of the research project

Findings in this project show that a consultative, broad-based community participation project in biodiversity conservation of lowland fynbos is possible. The project has also made a valuable contribution to closing the gap in our knowledge and understanding of the responses of local communities and specific user groups to the utilization and conservation of lowland fynbos areas, and WNR in particular. The project has also shown that despite the poor socio-economic conditions of local communities surrounding these areas, they are willing, are able, and want to be consulted regarding the future of these areas, and in the case of the WNR, support the area for biodiversity conservation. This project goes further in that it strengthens the findings of the C.A.P.E. study (Gelderbleom et al., 2003) and provides an example of how

a local community surrounding a PA is consulted in order to provide clear management guidelines to conserve such a lowland fynbos PA. The education study indicates that the utilization of a lowland fynbos area such as WNR to implement Outcomes Based Education bears great promise, but that it depends strongly on factors such as an official educational policy at district level on the use of WNR. This to be implemented based on a jointly developed, structured plan involving a quality INSET programme jointly agreed upon by teachers, WNR and educational managers at a district level.

Despite the aim to gain broad-based consultation, this project shows that different approaches are needed for different user groups when eliciting responses of these groups to the conservation of biodiversity in lowland fynbos. Although the findings for the responses of different user groups cannot be directly applied to other lowland fynbos PA's, the findings will be able to illuminate research processes in those contexts.

6.8.3. Personal reflections

While I spent most of my years as a quantitative scientist, the nature of this project has shown me that interactions in this project will require a quantitative-qualitative approach. I tried my best to ensure that the project was grounded in a participatory orientation, using a consultative, qualitative approach in initial pre-testing of the community questionnaires, in order to establish the range of issues appropriate for the surveys (Churchill, 1983). The grounded theory approach used with teachers ensured that themes emerged from the data (Strauss and Corbin, 1990), while I tried to maintain validity and authenticity through detailed reporting, data triangulation and member checking. I trust that the findings of this study will assist communities, lowland fynbos managers and researchers with insights to involving communities in biodiversity conservation of the smallest floral kingdom in the world.

REFERENCES



REFERENCES

- Abbot, J.L.O., Thomas, D.H.L., Gardner, A.A., Neba, S.E. & Khen, M.W. 2001. Understanding the links between conservation and development in the Bamenda highlands, Cameroon. *World Development* 29: 1115-36.
- Adams, W.M. 1996. *Future nature: a vision for conservation*. Earthscan Publications, London.
- Adams, W.M. and Hulme, D. 2001. If community conservation is the answer in Africa, what is the question? *Oryx* 35: 193-200.
- Adams, W.M. and Infield, M. 2001. Park outreach and gorilla conservation: Mgahinga Gorilla national Park, Uganda. In *African Wildlife and livelihoods: The promise and performance of Community Conservation* (eds D. Hulme & M. Murphree), pp. 131-147. James Currey, Oxford, U.K.
- Adams, J.S. & McShane, T.O. 1992. *The Myth of Wild Africa*. Berkeley, USA: University of California Press.
- Agrawal, A. and Gibson, C. 1999. Enchantment and Disenchantment: The role of community in natural resource management. *World Development* 27(4): 629-50.
- Agrawal, A. and Varughese, G. 2003. *Conservation's Visions: Poverty, Participation, and Protected area management in Nepal's Terai*. Project report. Department of Political Science, Yale University.
- Agyeman, J. 1998. Teaching urban nature at Key Stage 2 in England: looking at what is there, not at what ecologists say should be there. *Environmental Education Research* 4(2): 139-154.
- Akama, J.S., Lant, C.L. and Burnett, G.W. 1995. Conflicting attitudes towards state wildlife conservation programs in Kenya. *Society and Natural Resources*. 8: 133-144.
- Albrecht, S.L. and Thompson, J.G. 1988. The place of attitudes and perspectives in Social Impact Assessment. *Society and Natural Resources* 1: 69-80.
- Alpert, P. 1996. Integrated conservation and development projects. *BioScience*, 46: 845-55.
- Anderson, D. & Grove, R. (Eds.). 1987. *Conservation in Africa: People, Policies and Practice*. Cambridge, UK: Cambridge University Press: ix + 355pp.
- Andrade, G. 2000. The non-material values of the Mach Picchu World Heritage Site from acknowledgement to action. In: *Parks: Non-material values of protected areas* 10(2): 49-62.
- Apple, M.W. 1985. The culture and commerce of the textbook. *Journal of curriculum studies* 17(2): 147-162.

Archabald, K. and Naughton-Treves, L. 2001. Tourism revenue-sharing around national parks in Western Uganda: early efforts to identify and reward local communities. *Environmental Conservation* 28 (2): 135 – 149.

Armstrong, S. 1995. Tools for the townships. *New Scientist* 147 No. 1994: 14 – 15.

Ashley, C. 1995. Tourism, communities, and potential impacts on the local incomes and conservation. Directorate of Environmental Affairs, Ministry of Environment & Tourism, Namibia.

Ashley, C. & Garland, E. 1994. *Promoting community-based tourism development: why, what, where and how?* Research Discussion Paper o. 4, Ministry of Environment and Tourism, Windhoek, Namibia: 37 pp.

Ashwell, A. 2001. *Cape Flats Floral Treasures: A Teachers Guide to Active Learning in Cape Town Schools*. Botanical Society of South Africa. Cape Town.

Babbie, E.R. 1973. *Survey Research Methods*. Wadsworth Publishing Company, Inc., Belmont, California.

Bagwandeen, D. and Louw, W. 1993. *Theory and Practice of in-service Education and Training for Teachers in South Africa*. Pretoria: Van Schaik.

Bailey, K.D. 1978. *Methods of Social Research*. The Free Press, New York.

Balakrishnan, M. & Ndhlovu, D.E. 1992. Wildlife utilization and local people: a case study in Upper Lupande Game Management Area, Zambia. *Environmental Conservation* 19: 135-144.

Ball, S. 1987. *The micropolitics of the school: towards a theory of school organization*. London; Methuen.

Ballantyne, R. and Packer, J. 2002. Nature-based excursions: School Students' Perceptions of Learning in Natural Environments. *International Research in Geographical and Environmental Education* 11(3): 218-236.

Ballantyne, R., Fien, J. and Packer, J. 2001. School environmental education programme impacts upon student and family learning: A case study analysis. *Environmental Education Research* 7(1): 23-37.

Bamford, H. 2005. Table Mountain muggings forcing people to stay away. *The Argus* (Cape Town), 17 December 2005.

Barrow, E. and Fabricius, C. 2002. Do rural people really benefit from protected areas – rhetoric or reality? In Brown, J. and Kothari, J. (ed.) *Local communities and protected areas*. *Parks* 12(2): 67 – 79.

Barrow, E. and Murphree, M. 1998. *Community Conservation from concept to practice: a practical framework*. IDPM, University of Manchester.

Barrow, E. & Murphree, M.W. 2001. "Community Conservation from Concept to Practice. A Review of analytic issues," In: D. Hulme and M. Murphree, (Eds.). *African Wildlife and African Livelihoods: The promise and performance of community conservation*. Oxford: James Currey.

Barzetti, V. (Ed.). 1993. Parks and Progress. IUCN. – The World Conservation Union, Washington, DC, USA: xiii + 240pp., illustr.

Bauer, H. 2003. Local perceptions of Woza National Park, Northern Cameroon. *Environmental Conservation* 30(2): 175-181.

Bell, B. and Gilbert, J. 1994. Teacher development as professional, personal and social development. *Teaching and Teacher Education* 10(5): 483-497.

Bernbaum, E. 2000. The cultural and spiritual significance of mountains for the development of interpretive and educational materials at national parks. In: Putney, A. (ed). Non-material values of Protected Areas: *Parks* 10(2) 30 – 34.

Blackmore, J. 1998. The politics of gender and educational change: managing gender or changing gender relations? In Hargreaves, A., Lieberman, A., Fullan, M. & Hopkins, D. (eds.). (1998). *International Handbook of educational change*, Part 1. London: Kluwer Academic Publishers.

Blanco, N.C.P. 2002. An educational strategy for the environment in the National Park system of Venezuela. *Environmental Education Research* 8(4): 463-473.

Blasé, J. 1998. The micropolitics of educational change. In Hargreaves, A., Lieberman, A., Fullan, M. & Hopkins, D. (eds.). (1998). *International Handbook of educational change*, Part 1. London: Kluwer Academic Publishers.

Boo, E. 1990. Ecotourism: the potentials and pitfalls. World Wildlife Fund-US, Washington.

Borko, H., Davinroy, K., Bliem, C. & Cumbo, K. 2000. Exploring and supporting teacher change: two third-grade teachers' experiences in a mathematics and literacy staff development project. *The Elementary School Journal* 100(4): 273-306.

Brandon, K. 1996. Traditional people, nontraditional times: Social change and the implications for biodiversity conservation. In; Traditional peoples and biodiversity conservation in large tropical landscapes, ed. K.H. Redford, 219 – 265. Rosslyn, VA: The Nature Conservancy.

Brechin, S.R., P.R. Wilschusen, C.L. Fortwangler and P.C. West, 2002. Beyond the square wheel" Toward a more comprehensive understanding of biodiversity conservation as social and political process. *Society and Natural Resource*, 15: 41-64.

Breen, C., Mander, M., A'Bear, D. Little, T. & Pollet, T. 1992. Social conceptions of the roles and benefits of National Parks. Occasional Paper No. 119, Institute of Natural Resources, University of Natal, Pietermaritzburg, South Africa: 8pp.

Brijker, M. , de Jong, R. and Swaan, M. 1995. The need for support in secondary schools in the Netherlands in the implementation of Environmental Education. *Environmental Education Research* 1(1): 99-107.

Britton, P.E.N., 1972. *A Report on the Proposed Nature Reserve at Swartklip*. Unpublished Thesis, University of Stellenbosch.

Britton, P. and Jackelman, J. 1995. Wolfgat Nature Reserve. A wasteland destined for housing or a dynamic community conservation project. *Veld and Flora* 81: 46-48.

Brockington, D. 2002. *Fortress Conservation; the preservation of the Mkomazi Game Reserve, Tanzania*. Oxford: James Currey.

Brockington, D and Schmidt-Soltau, K. 2004. The Social and Environmental impacts of wilderness and development. *Oryx* 38: 140-142.

Brown, R. 2001. Lane Cove: national park in the city. In: McNeely, J.A. (ed). *Cities and Protected Areas: Parks* 11(3) 21-27.

Brown, J. and Kothari, A. 2003. Local communities and protected areas. *Parks* 12(2): 1-4.

Brown, M. & Wyckoff-Baird, B. 1995. *Designing Integrated Conservation and Development Projects, Revised Edition*. Landover, USA: Corporate Press.

Buckle, T. 1995. "Ndihlala e London". Reflections upon research in the Eastern Cape, Republic of South Africa. *TWPR* 17 (1): 97-109.

Burbidge, M. 1995. Nature right on the doorstep. *The Peninsula Times*. 31 August 1995.

Burger, J., Sanchez, J., Gibbons, J.W. & Gochfeld, M. 1998. Gender differences in recreational use, environmental attitudes, and perceptions of future land use at the Savannah River site. *Environment and Behaviour* 30(4): 472-486.

Carew-Reid, J. 1990. Conservation and protected areas on the South Pacific Islands: the importance of tradition. *Environmental Conservation* 17(1):29-38.

Caro, T., Borgerhoff Mulder, M, and Moore, M. 2003. Effects of conservation education on reasons to conserve biological diversity. *Biological Conservation* 114: 143 – 152.

Carr, W. and Kemmis, S. 1986. *Becoming critical. Education, knowledge and action research*. London. The Falmer Press.

Carruthers, J. 1989. Creating a national park, 1910 to 1926. *Journal of Southern African Studies* 15: 188-216.

Cartwright, J. 1991. Is there hope for conservation in Africa? *The Journal of Modern African Studies* 29: 355-371.

Census, 1991. Statistics SA, RSA Population Census 1991, South Africa. Pretoria.

Census, 1996. Statistics SA, RSA Population Census 1996, South Africa. Pretoria.

Child, B. 1996. The practice and principles of community-based wildlife management in Zimbabwe: the CAMPFIRE programme. *Biodiversity and Conservation* 5: 369-398.

Chisholm, L. 2000. *A South African Curriculum for the Twenty First Century*. Report of the Review Committee on Curriculum 2005. Pretoria: Government Printer.

Churchhill, G.A. Jnr. 1983. *Marketing Research: Methodological Foundations*. Third Edition. The Dryden Press, Chicago.

City Engineer's Department. 1982. *Greening of the City: Open space and recreation plan for Cape Town*. City Council, Cape Town.

City of Cape Town 2001. Wolfgat Nature Reserve. Draft Environmental Management Plan.

- City of Cape Town 2002. Urban Renewal Programme. City Council, Cape Town.
- City of Cape Town. 2003. *Mainstreaming Biodiversity in the City of Cape Town*. City Council, Cape Town.
- Cohen, L. and Manion, L. 1989. *Research methods in Education*. Routledge, London.
- Cock, J. and Fig, D. 2000. From colonial to community based conservation: environmental justice and the national parks of South Africa. Unpublished paper presented at the Racial Justice conference, University of Colorado, USA, September 1998.
- Colchester, M. 1996. Beyond "participation": indigenous peoples, biological diversity conservation and protected area management. *Unasylva* 186: 33-39.
- Conner, N. 2005. Some benefits of protected areas for urban communities: A view from Sydney, Australia. In T. Trzyna (ed.). *The Urban Imperative*. California Institute of Public Affairs, Sacramento, California. 168pp.
- Constitution of the Republic of South Africa. 1996. Chapter 2, Section 24 [www document]. URL <http://www.gov.za/constitution/1996/96cons.htm>
- Cowling, R.M., Holmes, P. and Rebelo, A.G. 1992. Diversity and Endemism. In: R.M. Cowling (ed.) *The ecology of fynbos. Nutrients, fire and diversity*. Oxford University Press, Cape Town, pp. 62-112.
- Cowling, R.M. and Richardson, D.M. 1992. *The ecology of fynbos. Nutrients, fire and diversity*. Oxford University Press, Cape Town.
- Cowling, R.M. and Richardson, D.M. 1995. *Fynbos: South Africa's Unique Floral Kingdom*. Fernwood Press, Vlaeberg, South Africa.
- Cowling, R.M. and Pressey, R.L. 2003. Introduction to systematic conservation planning in the Cape Floristic Region. *Biological Conservation* 112: 1-13.
- Cowling, R.M., Pressey, R.L., Rouget, M and Lombard, A.T. 2003. A conservation plan for a global biodiversity hotspot- the Cape Floristic Region, South Africa. *Biological Conservation* 12: 191-216.
- Crompton, J. 2003. The impact of parks and open space on property values and the property tax base. Appendix 1: The three collective public benefits that may accrue from park and recreation services. <http://www.rpts.tamu.edu/Faculty/CROMPTON.HTM>.
- Crowfoot, J.E. and Wondolleck, J.M. 1996. *Environmental disputes: Community involvement in Conflict Resolution*. Washington, D.C. Island Press.
- Dadds, M. 2001. Continuing professional development: nurturing the expert within. In Soler, J., Croft, A. & Bergess, H. *Teacher development, exploring our own practice*. Buckingham. Paul Chapman Publishing.
- Dassman, R.F. 1987. Conservation, Land Use and Sustainable Development. In: *For the Conservation of the Earth* (Ed. V. Martin). International Wilderness Leadership Foundation, Colorado.

Davies, R.J. 1993. Cost benefit analysis of Pilansberg National Park. Unpublished Masters degree research report, Graduate School of Business Leadership, University of South Africa, Midrand, South Africa: 112 pp.

Davis, G. 2003. Investing in Real Estate and adding to conservation capital. The story of Edith Stevens and a Wetland Park on the Cape Flats. *Botanical Society of South Africa*. pp. 31-35.

Davis, G. 2005. Biodiversity conservation as a social bridge in the urban context: Cape Town's sense of "The Urban Imperative" to protect its biodiversity and empower its people. In: Trzyna, T (ed.). *The Urban Imperative*. California Institute of Public Affairs, Sacramento, California. 96-104.

De Boer, W.F. & Baquete, D.S. 1998. Natural resource use, crop damage and attitudes of rural people in the vicinity of the Maputo Elephant Reserve, Mozambique. *Environmental Conservation* 25(3): 208-218.

De Bruin, S. 1995. Wolfgat – outdoor laboratory for local schools. *The Peninsula Times* (Cape Town), 31 August 1995.

De Bruin, S. 1996. Wolfgat lobbyists seek support from residents. *The Peninsula Times* (Cape Town), 3 October 1996.

De Bruin, S. 1997. Wolfgat closer to community. *The Peninsula Times* (Cape Town), 16 January 1997.

de Los Monteros, R.L. 2002. Evaluating ecotourism in natural protected areas of La Paz Bay, Baja California Sur, Mexico: ecotourism or nature-based tourism? *Biodiversity and Conservation* 11: 1539 – 1550.

Department of Education. 1995. *White Paper on Education and Training*. Pretoria. Government Printers.

Department of Education 1997a. *Lifelong learning for the 21st Century (Pamphlet)*. Pretoria. Government Printers.

Department of Education 1997b. *Curriculum 2005: Specific outcomes, assessment criteria and range statements Grades 1-9 (Discussion document)*. Pretoria. Government Printers.

Department of Education 1997c. *Outcomes-based education in South Africa. Background information for educators*. Pretoria. Government Printers.

Department of Education, 1998. *Assessment Policy in the General and Further Education and Training Band. Grades R to 9 and ABET*. Government Gazette No. 19640, 402. Pretoria: Government Printer.

Department of Education, 1999. *Norms and Standards for Educators*. Pretoria: Government Printer.

Department of Education, 2001. On WWW at <http://www.gov.za/yearbook/2001/education.html>. Accessed 19.12.05.

Dixon, J.A. and Sherman, P.B. 1990. *Economics of Protected Areas: A new look at benefits and costs*. Island Press, Washington, D.C.

White, T.G. and Jacobson, S.K. 1994. Evaluating conservation education programmes at a South American Zoo. *Journal of Environmental Education* 25(4): 18-22.

Dudley, N. 1992. Participatory principles in human enquiry: Ethics and methods in a study of the paradigm shift experience. *Qualitative studies in Education* 5 (4): 325-344.

Durbin, J. and Ralambo, J. 1994. The role of local people in successful maintenance of protected areas in Madagascar. *Environmental Conservation* 21(2): 115-120.

Elliot, J. 1990. Validating case studies. *Westminster Studies in Education* 13: 47-60.

Elliot, J. 1991. *Developing Community Focussed Environmental Education through Action Research*. Mimeograph. Centre for Applied Research in Education, School of education, University of East Anglia, Norwich, U.K. Reprinted in Robotom, I. 1993. (ed.) *Research in Environmental Education*. Geelong: Deakin University Press.

Elliot, J. 1992. Professional development in a land of choice and diversity: The future challenge for action research. Unpublished paper presented at the annual conference of the British Educational Research Association, University of Stirling. U.K.

Ellis, S. 1994. Of elephants and men: politics and nature conservation in South Africa. *Journal of Southern African Studies* 20: 53-69.

Emerton, L. 1998. The nature of benefits and the benefits of nature: Why wildlife conservation has not economically benefited communities in Africa. Community Conservation in Africa: principles and comparative practice. Discussion paper 7, Institute for Development Policy, Manchester University, Manchester, United Kingdom.

English, A. 2000. An emu in the hole: exploring the link between biodiversity and Aboriginal cultural heritage in New South Wales, Australia. In Putney, A. (ed.). Non-material values of protected areas, *Parks* 10(2): 13-25.

Enslin, P. 1990. Science and doctrine. Theoretical discourse in African Teacher education. In Nkomo, M. (ed), *Pedagogy of domination*. Trenton. Africa World Press Inc.

Fairclough, N. 1992. *Discourse and Social Change*. Polity Press. Cambridge.

Ferreira, G. 1998. Environmental Education through Hiking: a qualitative investigation. *Environmental Education Research* 4(2): 177-185.

Fiallo, E.A. & Jacobson, S.K. 1995. Local communities and protected areas: attitudes of rural residents towards conservation and Machalilla National Park, Ecuador. *Environmental Conservation* 22: 241- 248.

Fien, J. 1992. Education for the environment. Unpublished Ph.D. thesis. University of Queensland.

Fien, J. 1993. *Education for the environment. Critical curriculum theorising and Environmental Education*. Geelong, Victoria: Deakin University Press.

Fig, D. 1994. Ecotourism. Unpublished briefing paper for the DRC/ANC/COSATU/SACP/ SANCO. Mission on Environmental Policy, Group for Environmental Monitoring, Johannesburg, South Africa: 20 pp.

Fig, D. & Archer, F. 1993. Empowerment and the environment: Towards effective

community participation in the management of Richtersveld National Park, South Africa. Unpublished report. Group for Environmental Monitoring, Johannesburg, RSA, 21 pp.

Flynn, J., Slovic, P. and Mertz, C.K. 1994. Gender, race and perception of environmental health risks. *Risk Analysis* 14: 1101 – 1108.

Folch-Lyon, E. and Trost, J. 1981. Conducting focus group sessions. *Studies in Family Planning* 12(12): 443-449.

Fullan, M. 1991. *The meaning of educational change*. London. The Falmer Press.

Fullan, M. 1993. *Change forces: probing the depths of educational reform*. London: The Falmer Press.

Gelderbloem, C.M., Van Wilgen, B.W., Nel, J., Sandworth, T., Botha, M., Hauck, M. 2003. Turning strategy into action: implementing a conservation action plan in the Cape Floristic Region. *Biological Conservation* 112: 291-297.

Geoghegan, T. and Renard, Y. 2002. Beyond community involvement; lessons from the insular Caribbean. In; Brown, J. and Kothari, A. (eds.) *Local communities and Protected Areas*. *Parks*. 12(2): 16-27.

Gibson, R. 1986. *Critical Theory in Education*. Hodder and Stoughton, London.

Gillingham, S. and Lee, P.C. 1999. The impact of wildlife-related benefits on the conservation attitudes of local people around the Selous Game Reserve, Tanzania. *Environmental Conservation* 26: 218-28.

Giroux, H. 1981. *Ideology, Culture and the Process of Schooling*. Lewes: Falmer Press.

Giroux, H. 1987. Teachers as transformative intellectuals. *Social Education* 49 (5): 376-379.

Glaser, B. 1978. *Theoretical Sensitivity*. Mill Valley, California: Sociology Press.

Glaser, B. and Strauss, A. 1967. *The discovery of Grounded Theory*. Chicago, IL: Aldine.

Goode, W.J. and Hart, P.K. 1952. *Methods of Social Research*. McGraw-Hill, New York.

Goodman, J. 1992. Theoretical and practical considerations for school-based research in a post-positivist era. *Qualitative studies in Education* 5(2): 113-135.

Goodson, I. 1990. Studying curriculum: Towards a social constructivist perspective. *Journal of Curriculum Studies* 22(4): 299-312.

Goodwin, H. 1996. In pursuit of ecotourism. *Biodiversity and Conservation* 5: 277- 291.

Greenall Gough, A. 1993. *Founders in Environmental Education*. Geelong, Victoria: Deakin University Press.

Greenall Gough, A. and Robottom, I. 1993. Towards a socially critical environmental education: Water quality studies in a coastal school. *Journal of Curriculum Studies* 23 (4): 301-316.

Green, M.J.B. and Paine, J. 1997. *State of the World's Protected Areas at the end of the 20th Century*. Paper presented at the IUCN World Commission on Protected Areas Seminar

"Protected Areas in the 21st Century: From Islands to Networks". Cambridge, World Conservation Monitoring Group.

Grundy, S. 1982. Three modes of action research. *Curriculum Perspectives*, vol. 2 (3): 23-34. Reprinted in - - Kemmis & McTaggart (Eds). 1990. *The Action Research Reader*, Geelong, Victoria: Deakin University Press.

Grundy, S. 1987. *Curriculum: Products or Praxis*. London: Falmer Press.

Guba, E. and Lincoln, Y. 1989. *Fourth Generation Evaluation*. Newbury Park: Sage.

Hackel, J. 1990. Conservation attitudes in Southern Africa: a comparison between Kwazulu and Swaziland. *Human Ecology* 18: 203-9.

Hackel, J.D. 1999. Community conservation and the future of Africa's wildlife. *Conservation Biology* 13: 726-734.

Ham, S.H., Sutherland, D.S. and Meganck, R.A. 1993. Environmental Conservation 20 (3): 232 – 242.

Ham, S. and Sewing, D. 1988. Barriers to environmental education. *Journal of Environmental Education* 19(2): 17-24.

Hamilton, L. 2000. Some guidelines for managing mountain protected areas having spiritual and cultural significance. In Putney, A. (ed.). *Non-material values of protected areas, Parks* 10(2): 26-29.

Hamilton, A. and Walters, M. (eds.). 2002. *People and Plants Programme Handbook*. Issue 8, 48pp.

Hamilton-Smith, E. 2001. *The Social Benefits of Public Open Space: a review*. Sydney Urban Parks Education and Research (SUPER) Group, Sydney.

Hanekom, D. & Liebenberg, L. 1994. Utilization of National Parks with special reference to the costs and benefits to communities. *Bulletin of the Grasslands Society of South Africa* 5(2): 25-36.

Hannah, L. 1992. *African People, African Parks*. Conservation International, Washington, D.C. U.S.A: 76pp.

Happold, D.C.D. 1995. The interactions between humans and mammals in Africa in relation to conservation: a review. *Biodiversity and Conservation* 4: 395-414.

Harmon, D. 1987. Cultural diversity, human subsistence, and the national park ideal. *Environmental Ethics* 9: 147-158.

Harcourt, A.H., Pennington, H and Weber, A.W. 1986. Public attitudes to wildlife and conservation in the third world. *Oryx* 20: 152-4.

Harding, S. 1987. Introduction: Is there a feminist method? In Harding, S. (ed), *Feminism and methodology: Social science issues*. Bloomington: Indiana University Press.

Hargreaves, A. 1994. *Changing teachers, changing times. Teachers work and culture in the postmodern age*. London. The Falmer Press.

Hargreaves, A. and Fullan, M. (eds.). 1992. *Understanding teacher development*, New York: Teachers College Press, Teachers College, Columbia University.

Hatton, E. 1997. Teacher educators and the production of bricoleurs: an ethnographic study. *Qualitative Studies in Education* 10 (2) : 237-257.

Hartup, B.K. 1994. Community conservation in Belize: Demography, Resource use, and attitudes of participating landowners. *Biological Conservation* 69: 235-241.

Hatsthorn, K. 1985. INSET for South Africa. Issues, guidelines and priorities. In Ashley, M and Mehl, M. (eds), *INSET in South Africa: Issues and directions*. Teacher Opportunities Programmes, Cape Town.

Hauck, M. and Sowman, M. 2003. *Waves of change*. Cape Town: University of Cape Town Press.

Haynes, J.S. 1998. Involving communities in managing protected areas: contrasting initiatives in Nepal and Britain. *Parks* 8(1).

Heinen, J.T. 1993. Park-people relations in Kosi Tappu Wildlife Reserve, Nepal: a socio-economic analysis. *Environmental Conservation* 20: 25-34.

Heinen, J.T. 1996. Human Behaviour, incentives and protected area management. *Conservation Biology* 10: 681-4.

Hendy, Q.B. and Hendy, H. 1968. New Quaternary fossil sites near Swartklip, Cape Province. *Annals of the South African Museum* 52: 43-73.

Heywood, V.H. 1995. *Global Biodiversity Assessment*. Cambridge University Press, Cambridge.

Hilton-Taylor, C. 1996. Red Data List of Southern African Plants. *Strelitzia* 4: 1-20. National Botanical Institute, Pretoria.

Hockings, M., Carter, B. and Leverington, F. 1998. An integrated model of public contact planning for conservation management. *Environmental Management* 22 (5): 643-654.

Holmes, C.M. 2003. The influence of protected area outreach on conservation attitudes and resource use patterns: a case study from western Tanzania. *Oryx* 3(3): 305 – 315.

Holmes, C.M. 2003. Assessing the perceived utility of wood resources in a protected area of Western Tanzania. *Biological Conservation* 111: 179-189.

Hope, A. and Timmel, S. 1986. *Training for Transformation. A Handbook for Community Workers*. Gweru, Zimbabwe: Mambo Press.

Hough, J.L. 1988. Obstacles to the effective management of conflicts between national parks and surrounding human communities in developing countries. *Environmental Conservation* 5: 129-36.

Huckle, J. 1991. Education for sustainability: Assessing pathways to the future. *Australian Journal of Environmental Education* 7: 43-62.

Huckle, J. 1993. Environmental Education and Sustainability: A view from critical theory. In Fien, J; Trainer, T. (eds.). *Environmental Education: A Pathway to Sustainability*. Geelong, Victoria: Deakin University Press.

Huckle, J. 1995a. *Reaching Out: Education for Sustainability. (Tutors' Handbook- Part 1)*. Godalming: WWF (UK).

Huckle, J. 1995b. Connecting theory and practice in education for sustainability: Progress and paradox. A background paper for a plenary session presented at EEASA '95 conference, 18-21 July 1995. Kearsney College, Durban.

Hulme, D. & Murphree, M. (Eds.). 2001. *African Wildlife and African Livelihoods: The promise and performance of community conservation*. Oxford: James Currey.

Hungerford, H. and Volk, T. 1990. Changing learner behaviour through Environmental Education. *Journal of Environmental Education* 21(3): 8-21.

Hutton, J., Adams, W.M. and Murombedzi, J.C. 2005. Back to the barriers? Changing narratives in biodiversity conservation. *Forum for Development Studies* 2: 343-370.

IIED. 1994. Whose eden? An overview of community approaches to wildlife management. Report to the British Overseas Development Administration. International Institute for Environment and Development, London, UK: xv+124 pp.

Infield, M. 1988. Attitudes of a rural community towards conservation and a local conservation area in Natal, South Africa. *Biological Conservation* 45: 21-46.

Infield, M. 2001. Cultural values; a Forgotten strategy for building community support for protected areas in Africa. *Conservation Biology* 15(3): 800 – 802.

Infield, M. and Adams, W.M. 1999. Institutional sustainability and community conservation: a case study from Uganda. *Journal of International Development* 11:305-315.

Infield, M. & Namara, A. 2001. Community attitudes and behaviour towards conservation: an assessment of a community conservation programme around Lake Mburo National Park, Uganda. *Oryx* 35: 48-60.

Ingold, T. 1992. Culture and perception of the environment. Pages 39-56. In: E. Croll and D. Parkin (Eds.). *Bush base: farm forest: culture, environment and development*. Routledge, London. Intergovernmental Conference on Environmental Education 1978.

Isaacs, M, Hara, M., and Nielsen, J.K. 2005. South African Fisheries Reform- past, present and future? Research report; no. 16. Programme for Land and Agrarian Studies, School of Government, University of the Western Cape.

Ite, U.E. 1996. Community perceptions of the Cross River National Park, Nigeria. *Environmental Conservation* 23: 351-357.

IUCN. 1980. *World Conservation Strategy: Living Resource Conservation for Sustainable Development*. IUCN, Gland, Switzerland.

IUCN, 2003. *Protected areas in 2023: Scenarios for an uncertain future*. Presented to the Vth World Congress on Protected Areas, Durban- South Africa- September 2003. 51p. Gland Switzerland

IUCN/UNEP/WWF. 1992. *Caring for the Earth. A Strategy for Sustainability*. Gland, Switzerland: IUCN.

Jackelman, J. and Britton, P. 1995. Public participation in environmental planning: tentative steps from rhetoric to reality. *Bull. S. Afr. Inst. Ecol. Environ. Scientists* 14(1): 6-9.

James, A.N., Gaston, K.J., and Balmford, A. 1999. Balancing the Earth's accounts. *Nature* 401: 323-324.

Janse van Rensburg, E. 1995. Environmental Education and research in Southern Africa: a landscape of shifting priorities. Unpublished Ph.D. thesis. Grahamstown: Rhodes University.

Jarman, M.L. 1986. Conservation priorities in lowland regions of the Fynbos Biome. South African National Scientific Programmes Report 87, CSIR, Pretoria.

Jha, S. 2005. Can natural world heritage sites promote development and social harmony? *Biodiversity and conservation* 14: 981-991.

Johnson-Prynn, J.S. and Johnson, L.R. 2005. Successes and challenges in East African Conservation Education. *Journal of Environmental Education* 36(2): 25-39.

Jones, B.T.B. 1999. Policy lessons for the evolution of a community-based approach to wildlife management, Kunene Region. Namibia. *Journal of International Development* 11: 295-304.

Kangwana, K. and R. Ole Mako. 1998. The impact of community- conservation initiatives around Tarangire National Park, Tanzania (1992-1997). *Community Conservation in Africa: principles and comparative practice*. Discussion paper 16, Institute for Development Policy, Manchester University, Manchester, United Kingdom.

Kaplan, R. and Talbot, J.F. 1988. Ethnicity and preference for natural settings: A review and recent findings. *Landscape and Urban Planning* 15: 107-117.

Keane, C. 1998. Evaluating the influence of fear of crime as an environmental mobility restrictor on women's routine activities. *Environment and Behaviour* 30(1): 60-74.

Kellert, S.R. 1996. *The Value of Life: Biological Diversity and Human Society*. Washington, DC, USA: Island Press.

Kemmis, S. 1988. Action Research. In J.P. Keaves (Ed.). *Educational Research Methodology and Measurement: An International Handbook*. New York. Permagon Press.

Kemmis, S. and Mc Taggart, R. 1988. *The Action Research Planner*. Third Edition. Geelong: Deakin University Press.

Kemmis, S., Cole, P. & Sugget, D. 1983. *Orientations to Curriculum and Transition: Towards the Socially Critical School*. Melbourne: Victorian Institute of Secondary Education.

Khan, F. 1994. Wolfgat Nature Reserve: *A Report on the Opinions of Visitors and Mitchell's Plain Residents*. Environmental Advisory Unit, University of Cape Town. 41 pp.

Khan, F.H. and Friedman, B. 1998. On Nature and Environmental Education: black parents speak from the inner city. *Environmental Education Research* 4(1): 25-39.

Kahn, P.H.Jr. and Kellert, S.R. (eds.) 2002. *Children and Nature: Psychological, sociocultural and evolutionary investigations*. MIT Press, Cambridge, Massachusetts.

Kincheloe, J.L. and McLaren, P.L. 1994. Rethinking critical theory and qualitative research. In Denzin, N.K. & Lincoln, Y.S. (Eds) 1994. *Handbook of Qualitative Research*. Sage, London.

Kirk, D. 1990. School knowledge and the curriculum package-as-text. *Journal of Curriculum Studies* 22(5): 409-425.

Klein, R.G. 1975. Paleoanthropological implications of the non-archeological bone assemblage from Swartklip 1, South Western Cape Province, South Africa. *Quaternary Research* 5: 275-288.

Knapp, C. 1990. Outdoor education in the United States: Yesterday, today and tomorrow. In: K, McRae (ed.). *Outdoor and Environmental Education: Diverse Purposes and Practices*. Melbourne: Macmillan.

Koch, E., Nyoni, J & Associates 1995. Dead cows, a long bicycle ride, the fence of fire and a man on the run: linking human livelihoods, transfrontier conservation and the protection of biological diversity in Southern Africa. Unpublished report for the UN Research Institute for Social Development, Geneva and Group for Environmental Monitoring, Johannesburg, South Africa. 215 pp.

Krippendorff, K. 1980. *Content Analysis: An Introduction to its Methodology*. Newbury Park, CA, USA: Sage Publishing.

Kritzing, J. 1994. The methodology of focus groups: the importance of interaction between research participants. *Sociology of Health and Illness* 16 (1).

Kruger, O. 2005. The role of ecotourism in conservation: panacea or Pandora's box? *Biodiversity and Conservation* 14: 579-600.

Kuo, F.E., Bacaicoa, M., & Sullivan, W.C. 1998. Transforming inner-city landscapes: Trees, sense of safety, and preference. *Environment and Behaviour* 30(1): 28-59.

Lather, P. 1986a. Research as Praxis. *Harvard Educational Review* 56(3): 257-277.

Lather, P. 1986b. Issues of validity in openly ideological research: Between a rock and a soft place. *Interchange* 17(4): 63-84.

Laurelia, A. 1998. Reformatory In-service education for teachers (Rinset) as a collaborative action and learning enterprise: experiences from a Finnish context. *Teaching and Teacher Education* 14(1): 53-66.

Leader-Williams, N., 2002. Animal conservation, carbon and sustainability. *Philosophical Transactions of the Royal Society of London Series A*. 360: 1787 – 1806.

Le Maitre, D.C., Gelderblom, C., Maphasa, L., Yssl, S., van den Belt, M. and Manuel, T.L. 1997. Communicating the value of fynbos: results of a survey of stakeholder. *Ecol. Econ.* 22:105-121.

Lewis, D., Kaweche, G.B. & Mwenya, A.A. 1990. Wildlife conservation outside protected areas- lessons from an experiment in Zambia. *Conservation Biology* 4:171-180.

Lewis, C. 1996. Managing conflicts in protected areas. Gland, Switzerland and Cambridge, UK: IUCN.

Lochner, P., Weaver, A., Gelderbloem, C., Paert, R., Sandwith, T., Fowkes, S., 2003. Aligning the diverse: the development of a biodiversity conservation strategy for the Cape Floristic Region: *Biological Conservation* 112: 29-43.

Lotz, H.B. 1995a. The potential for transformation and development of primary teachers in contemporary society: Perspectives on reform, teachers and the conditions of change. Unpublished paper presented at the National Primary Education Conference, 21-23 February 1995. Magoebaskloof.

Lotz, H.B. 1995b. Resource material development in environmental education: Exploring some of the myths and tensions in participatory resource development in the We Care Primary project. *Southern African Journal of Environmental Education* 15: 78-90.

Lotz, H.B. 1996. The Development of Environmental Education Resource Materials for Junior Primary Education through Teacher Participation: The case of the We Care Primary project. Unpublished Ph.D. thesis. Stellenbosch University, Stellenbosch.

Lotz, H.B. 1997. Outcomes Based Education and Curriculum 2005. *Enviroteach* 5(3): 3-5.

Lotz, H and Olivier, C. 1998. Clarifying orientations to learning programme development within the OBE curriculum framework and the Learning for Sustainability Curriculum 2005 Pilot Project in Gauteng and Mpumalanga. Unpublished paper presented at the Outcomes Based Education International Symposium, Vista University, 17-18 November, 1998.

Lotz-Sisitka, H.B. and Raven, G. 2001. *Active Learning in OBE: Environmental Learning in South African Schools*. Research Report of the National Environmental Education Programme- GET Pilot Research Report. Pretoria: Department of Education.

Low, A.B. 1991. *Environmental Survey and Management Guidelines for the Wolfgat Nature Reserve*. Report prepared for the City Engineers Department, City of Cape Town.

Lubisi, C., Wedekind, V., Palker, B. & Gultig, J. 1997. (Eds.). Reader: Understanding Outcomes Based education. Knowledge, curriculum and assessment in South Africa. Braamfontein: South Africa Institute for Distance Education.

Lucket, S., Mkhize, K. and Potter, D. 2003. The experience of local boards in Kwazulu-Natal, South Africa. In; Borrini-Feyerabend, G. and Sandwith, T. (eds.) Conservation Partnerships in Africa: *Parks*. 13(1): 6-15.

MacKinnon, K. 2001. Integrated Conservation and Development Projects. *Parks* 11(2): 1 – 5.

MacKinnon, J.; MacKinnon, K.; Child, G. and Thorsell, T. 1986. *Managing Protected Areas in the Tropics*. IUCN, Gland.

Makombe, K. (Ed.). 1993. Sharing the Land: Wildlife, people and development in Africa. IUCN/ROSA Environmental Issues Series 1. IUCN Regional Office for Southern Africa, Harare, Zimbabwe: 32pp.

Manuel, T.L. 1995. Curriculum innovation in Mitchells Plain schools. The Wolfgat Nature Reserve project. Unpublished Research progress Report, Institute of Plant Conservation, University of Cape Town.

Markdata- HSRC. 1996. Grid to select a household and a respondent. Human Sciences Research Council, South Africa. Pretoria.

Marklund, S. and Keeves, J.P. 1988. Research needs and priorities. In Keeves, J.P. (Ed.) 1988. *Educational Research, Methodology and Measurement: An International Handbook*. Pergamon, Oxford.

Maslow, A.H. 1954. *Motivation and personality*. Haper and Row. New York.

Masokoane, G. 1993. Tackling racism in textbooks. In Kromberg, S. (Ed). *Publishing for democratic Education* Johannesburg. Sached Books..

Mason, P.M. 1995. Wildlife conservation in the long term – Uganda as a case study. MSc Thesis. Oxford University, Oxford, United Kingdom.

Maze, K. & Rebelo, A. 1999. Core Flora Conservation Areas on the Cape Flats. Flora Conservati.on Committee Report 99/1. Botanical Society of South Africa. Claremont.

Maze, K., T. Katzschnher, and B. Myrdal. 2002. Conserving an embattled flora: Mainstreaming biodiversity issues in urban Cape Town. In Pierce, S.M. , R.M. Cowling, T. Sandwith and K. MacKinnon (eds.). *Mainstreaming Biodiversity in Development*. The World Bank, Washington.

McDonald, D. 1994. Fried green beaurocrats. *New Ground* 17: 39 – 41.

McDowell, C.R., A.B. .Low, 1990. Conservation priority survey of the Cape Flats. University of the Western Cape, Bellville.

McDowell, C.R., A.B. .Low, and B. McKenzie, 1991. Natural remnants and corridors in Greater Cape Town: their role in threatened plant conservation. Pages 27-29. In: D.A. Saunders and R.J. Hobbs (eds.). *Nature Conservation 2. The role of corridors*. Surrey Beatty and Sons, Chipping Norton, New South Wales.

McFadden, C.P. 1992. Author-published-educator relationship and curriculum reform. *Journal of Curriculum Studies* 24(1):71-87.

McGregor, J. 1995. Gathered produce in Zimbabwe's communal areas changing resource availability and use. *Ecology of food and Nutrition* 33:163-93.

McKenzie, B. and Rebelo, T. 1997. Core Flora Conservation Areas on the Cape Flats. Unpublished report FCC Report 91/1, Botanical Society of South Africa.

McLaughlin, M.W. 1998. Listening and learning from the field: tales of policy implementation and situated practice. In Hargreaves, A., Lieberman, A., Fullan, M. & Hopkins, D. (eds.). (1998). *International Handbook of Educational Change*, Part 1. London: Kluwer Academic Publishers.

McNaught, C. and Raubenheimer, D. 1991. *Critical reflections of teachers in action: An evaluation report of the Natal Primary Science Project*. Durban: The Urban Foundation.

McNeely, J.A. 1993. Economic incentives for conserving biodiversity: lessons from Africa. *Ambio* 22(2-3): 144-150.

McNeely, J. (ed.). 1992. *Parks for Life: report of the IV th World Congress on National Parks and Protected Areas*. Gland, Switzerland: IUCN.

McNeely, J.A. 2001. Globally significant biodiversity within city limits: the case of South Africa's Cape. In: McNeely, J.A. (ed). *Cities and Protected Areas: Parks* 11(3) 44-47.

McTaggart, R. 1991a. *Action Research. A Short Modern History*. Geelong Victoria: Deakin University Press.

McTaggart, R. 1991b. Principles for participatory action research. *Adult Education Quarterly* 41(3): 168-187.

Mehta, J.N. & Kellert, S.R. 1998. Local attitudes towards community-based conservation policy and programmes in Nepal: a case study in the Makulu-Barun Conservation Area. *Environmental Conservation* 25: 320-333.

Mehta, J.A. and Heinen, J.T. 2001. Does community-based conservation shape favourable attitudes among locals? An empirical study from Nepal. *Environmental Conservation* 28: 165-177.

Meloy, J.M. 1994. *Writing the Qualitative Dissertation: Understanding by Doing*. New Jersey: Lawrence Erlbaum Associates, Publishers.

Meyers, L.S. and Grossen, N.E. 1974. *Behavioural Research. Theory, Procedure, and Design*. W.H. Freeman and Company, San Francisco.

Michael, S.N. & Hull, R.B. 1994. *Effects of vegetation on crime in urban parks*. Blacksburg: Virginia Polytechnic Institute and State University, Department of Forestry, College of Forestry and Wildlife Resources.

Mickelson, R., Nkomo, M. & Smith, S. 2001. Education, ethnicity, gender, and social transformation in Israel and South Africa. *Comparative Education Review* 45(1): 1-35.

Mintrop, H. 1996. Teachers and changing authority patterns in East German schools. *Comparative Education Review* 40 (4): 358-376.

Mishra, H.R. 1982. Balancing human needs in Nepal's Royal Chitwan. *Ambio* 11: 246-51.

Mitchell, N.; Slaibly, B. and Benedict, M. 2002. Local Community Leadership: building partnerships for conservation in North America. In: Brown, J. and Kothari, A. (eds.) *Local Communities and Protected Areas. Parks* 12 (2): 55- 66.

Mittermeier, R.A. and da Fonseca, G. 2003. Brief window for Biodiversity, *Our Planet* 14 (2): 14-15. UNEP.

Mittermeier, R.A., Myers, N., Thorsen, J.B., da Fonseca, G.A.B., Olivieri, S. 1998. Biodiversity hotspots and major tropical wilderness areas: approaches to setting conservation priorities. *Conservation Biology* 12: 516-520.

Mordi, R. 1987. Public attitudes towards wildlife in Botswana. Ph.D. thesis, Yale University, New Haven, Connecticut, USA.

Moser, C.A. and Kalton, G. 1972. *Survey Methods in Social Investigation*. 2nd Edition. Basic Books. New York.

Mrazek, R. (Ed.). 1993. *Alternative Paradigms in Environmental Education Research*. Ohio: NAAEE.

- Murphree, M.W. 1991. Economic, extension and cultural considerations for commercialization. In: *Wildlife Research for Sustainable Development*, (ed.). J.G. Grootenhuis, S.G. Njunguna & P.W. Kats, pp. 137-46, Nairobi, Kenya: National Museum of Kenya.
- Murphree, M.W. 1994. The role of institutions in community-based conservation. In *Natural Connections: Perspectives in Community-Based Conservation*. Ed. D. Western, M. Wright & S. Strum, pp. 403-27. Washington DC: Island Press, xix + 559 pp.
- Murphree, M.W. 2000. Community-based conservation: Old ways, New Myths and Enduring Challenges. Conference on: African Wildlife Management in the New Millenium. College of African Wildlife Management, Mweka, Tanzania, 13-15 December 2000.
- Murphree, M.W. 2001. A case study of ecotourism development from Mahenye, Zimbabwe, pp. 177-194. In Hulme, D. & Murphree, M. (Eds.). *African Wildlife and African Livelihoods: The promise and performance of community conservation*. Oxford: James Currey.
- Myers, N., Mittermeier, R.A., Mittermeier, C.G., da Fonseca, G.A.B., Kent, J. 2000. Biodiversity hotspots for conservation priorities. *Nature* 403: 853-858.
- Nash, R. 1982. *Wilderness and the American mind*. Yale University Press, New Haven, Connecticut.
- Nepal, S.K. and Weber, K.E. 1995. Prospects for co-existence: wildlife and local people. *Ambio* 24: 238 – 245.
- NEPI (National Education Policy Investigation). 1993. *The Framework Report*. Cape Town: Oxford University Press/ NECC.
- Neumann, R.P. 1998. *Imposing wilderness: Struggles over livelihood and nature preservation in Africa*. Berkley: University of California Press.
- Newmark, W.D. and Leonard N.L. 1991. The attitudes of local people toward Kilimanjaro National Park and Forest Reserve. In: *The Conservation of Mount Kilimanjaro*, ed. W.D. Newmark, IUCN, Gland, pp. 87-96.
- Newmark, W.D., Manyanza, D.N., Gamassa, D.M. and Sariko, H.I. 1992. The conflict between wildlife and local people living adjacent to protected areas in Tanzania: the influence of human density.
- Newmark, W.D., Leonard, L., Sarico, D.G. & Gamasa, G.M. 1993. Conservation attitudes of local people living adjacent to five protected areas in Tanzania. *Biological Conservation* 63: 177-183.
- Newmark, W.D., Manyanza, D.N., Gamassa, D.M. and Sariko, H.I. 1994. The conflict between wildlife and local people living adjacent to protected areas in Tanzania: human density as a predictor. *Conservation Biology* 8:249-55.
- Nguta, F. 1992. *Khayelitsha resident's opinion on the need for natural open space and the future of Driftsands as a multi-use area*. National Botanical Institute, Kirstenbosch.
- Noemdoe, S. 2001. Putting people first in an Invasive alien plant clearing programme: Working for Water Programme. In: McNeely, J.A. (ed.) *The Great Reshuffling: Human Dimensions of Invasive Alien Species*. IUCN, Gland, Switzerland, 121-12

- Noss, A.J. 1997. Challenges to nature conservation with community development in Central African Forests. *Oryx* 31: 180-188.
- Nyhus, P.J., Tilson, S. & Tilson, R. 2003. Wildlife knowledge among migrants in southern Sumatra, Indonesia: Implications for conservation. *Environmental Conservation* 30 (2): 192-199.
- Oates, J.F. 1999. *Myth and reality in the Rain Forests; How conservation strategies are failing in West Africa*. Berkeley: University of California Press.
- O'Donoghue, R. 1990. *Environmental Education, evaluation and curriculum change: the case of the action ecology project*. Unpublished Master of Education thesis, University of Natal, Pietermaritzburg.
- O'Donoghue, R. 1993. *Environment, Development and Environmental Education*. Howick: SHARE-NET.
- O'Donoghue, R. 1994. Environmental Education in South Africa: Some historical trends and recent developments. In: Levy, S. (Ed.). *Projects Speak for Themselves*. Houghton: Sharon Levy.
- O'Donoghue, R. 2001. *Environment and Active Learning in OBE. NEEP guidelines for facilitating and assessing active learning in OBE*. Howick: Share-Net.
- O'Donoghue, R and McNaught, C. 1991. Environmental Education. The development of a curriculum through "grass-roots" reconstructive action. *International Journal of Science Education* 14(4): 391-404.
- O'Donoghue, R. and Taylor, J. 1988. Towards participant-centred resource development for environmental education. *Southern African Journal of Environmental Education* 7: 3-6.
- Pape, J. 1998. Changing education for majority rule in Zimbabwe and South Africa. *Comparative Education Review* 42 (3): 253-266.
- Parker, P. and Punturiero, M. 2005. Community-driven stewardship of an Australian government protected area. In: Trzyna, T. (ed.). 2005. *The Urban Imperative*. California Institute of Public Affairs, Sacramento, California. pp. 68 – 72.
- Parry, D. and Campbell, B. 1992. Attitudes of rural communities to animal wildlife and utilization in Chobe Enclave and Mababe Depression, Botswana. *Environmental Conservation* 19: 245-52.
- Pennington, H.. 1983. A living trust. Tanzanian attitudes towards wildlife and conservation. MSc thesis. Yale University, New Haven, Connecticut.
- Petersen, C., Jaffer, N. and Sunde, J. 2005. Making local communities visible in the Marine Protected Areas process. Unpublished research report. Programme for Land and Agrarian Studies, School of Government, University of the Western Cape.
- Phillips, A. and Gay, H. 2001. Nature in cities – biodiversity and protected areas in London. In: McNeely, J.A. (ed). *Cities and Protected Areas. Parks* 11(3): 35-43.
- Phillips, O. & Gentry, A. 1993. The useful plants of Tambopata, Peru: II. Additional hypothesis testing in quantitative ethnobotany. *Economic Botany* 47: 33-43.

Picard, C.H. 2003. Apartheid perceptions of the Greater St Lucia Wetland Park, South Africa. *Environmental Conservation* 30 (2): 182-191.

Pillay, A. and Naidoo, P. 1994. Curriculum development in environmental education for student science teachers. An action research study. Paper presented at the 10STE Symposium Science and Technology Education in a demanding society. De Koningshof Veldhoven, The Netherlands.

Pimbert, M.P. and Pretty, J.N. 1995. Parks, people and professionals: Putting participation into protected area management. UNRISD/WWF-International/IID, Geneva.

Pithouse, K. 2001. Adapt or die? A teacher's evaluation of a Curriculum 2005 "retraining workshop". *Perspectives in Education* 19(1): 154-158.

Plainsman, The, 1997. School raises awareness about pollution in Wolfgat Nature Reserve. June 11, 1997.

Pollock, G. 1994. Eco-tourism: the Kwazulu-Natal case study. In: Robinson, R. (ed.). African Heritage 2000. The future of Protected Areas in Africa, IUCN, Switzerland.

Polyzoi, E. and Cerna, M. 2001. A dynamic model of forces affecting the implementation of educational change in the Czech Republic. *Comparative Education Review* 45(1): 64-84.

Popkewitz, T.S. 1984. *Paradigms and Ideology in Educational Research. The Social Functions of the Intellectual*. New York: Falmer Press.

Potenza, E. and Monyokolo, M. 1999. A destination without a map: Premature implementation of Curriculum 2005? In Jansen, J. & Christie, P. (eds.). *Changing curriculum studies in Outcomes Based education in South Africa*. Cape Town: Juta.

Preston, G. 1995. The effects of a user-pays approach and conservation measures on the use of water and electricity by visitors to Mopani Rest Camp in the Kruger National park. Consolidated report to the National Parks Board. Department of Environmental and Geographical Science. University of Cape Town.

Preston, G. 1989. Attitudes of business leaders and professional ecologists to conservation in South Africa. Unpublished Ph.D. Thesis. University of Cape Town, Cape Town.

Punch, M. 1986. *The Politics and Ethics of Fieldwork*. Newbury Park: Sage Publications.

Quingkui, L. 2003. Conflict management of nature reserves in the upper reach of the Yuan-Red River watershed, Southeast Yunnan Province, China.

Rampele, M. and McDowell, C. (eds.). 1991. Restoring the land: environment and change in post-apartheid South Africa. London: Panos.

RDP. 1994. RDP White Paper. CTP Printers, Cape Town.

Reddy, C. 2001. Teacher responses to education policy reforms: Case studies of in-service processes in the Western Cape Province of South Africa. Unpublished Ph.D. thesis. University of Stellenbosch.

Richardson, V. 1996. The role of attitude and beliefs in learning to teach. In: J. Sikula, T. Buttery & E. Guyton (Eds.) *Handbook of research on teacher education* (2nd edition). New York. MacMillan, pp 102-119.

Roberts, M. 1997. Reconstructing the Geography National Curriculum: Professional Constraints, Challenges and Choices. In: Helsby, G. and McCulloch, G. (eds.) *Teachers and the National Curriculum*. Cassel, London.

Robinson, M. 1993. Action Research and the challenge of change. In Davidoff, S *et al.* (Eds.). *Emancipatory Education and Action Research*. Pretoria. HSRC.

Robottom, I. 1987a. Towards enquiry-based professional development in environmental education. In Robottom, I. (Ed.). *Environmental Education: Practice and Possibility*. Geelong, Victoria: Deakin University Press.

Robottom, I. 1987b. Contestation and consensus in environmental education. *Curriculum Perspectives* 7(1): 23-27.

Robottom, I. 1987c. Two paradigms of professional development in Environmental Education. *The Environmentalist* 7(4): 291-298.

Robottom, I. and Hart, P. 1993a. *Research in Environmental Education*. Geelong: Deakin University Press.

Robottom, I. and Hart, P. 1993b. Towards a meta-research agenda in science and environmental education. *International Journal of Science Education* 15 (5): 591-605.

Rogers, J. 1982. Lithostratigraphy of Cenozoic sediments between Cape Town and Elands Bay. Report of the Geological Survey South Africa (Open file), 1980-165: 1-64.

Rogers, J. Thamm, A.G., Hartnady, C.J.H. 1990. *Cape Peninsula Excursion*. Geocongress 1990 – Excursion guide. *Geological Society of South Africa* 15: 121-137.

Rouget, M., Richardson, D.M., Cowling, R.M. 2003. The current configuration of protected areas in the Cape Floristic Region, South Africa- reservation bias and representation of biodiversity patterns and processes. *Biological Conservation* 112: 129-145.

Rome, A and Romero, B. 1998. Enhancing conservation education opportunities in Nature Reserves in Tropical Countries: A case study in Belize. *Journal of Environmental Education* 30 (1): 34-37.

Sah, M.A. & Heinen, R.J. 2001. Wetland resource use and conservation attitudes among indigenous and migrant peoples in Ghodaghodi Lake area, Nepal. *Environmental Conservation* 28: 345-356.

SALDRU, 2003. *Khayelitsha/ Mitchells Plain Survey 2000: Survey Report and Baseline Information*. Unpublished report. South African Labour and Development Research, University of Cape Town, Cape Town.

Sanderson, E.W., Redford, K.H., Vedder, A., Coppolillo, P.B. & Ward, S.E. 2002. A conceptual model for conservation planning based on landscape species requirements. *Landscape and Urban Planning* 58: 41 – 56.

Savahl, C. 1993. What kind of knowing is socially critical action research? In Davidoff, S. *et al.* (Eds.). *Emancipatory Education and Action Research*. Pretoria: HSRC.

Schenshul, J. and Schenshul, S. 1991. Methods of inquiry for social change. In Le Compte, M.; Millroy, W.; Preissle, J. (Eds.). *The Handbook of Qualitative Research in Education*. San Diego: Academic Press.

Schreuder, D. 1994. The Schools Water Project (SWAP). *Australian Journal of Environmental Education* 10: 35-46.

Schreuder, D. 1995. Environmental Education at the crossroads: Rhetoric and Reality in educational reconstruction in South Africa. Paper presented at the NAAEE Conference, September 1995. Portland, Maine.

Schroeder, H.W. & Anderson, L.M. 1984. Perception of personal safety in urban recreation sites. *Journal of Leisure Research* 16(2): 178-194.

Schwant, T. 1997. *Qualitative Enquiry: A dictionary of terms*. London: Sage.

Sedibe, K. 1998. Dismantling apartheid education: an overview of change. *Cambridge Journal of Education* 28 (3): 268-273.

Shackley, M. 1996. Too much room at the inn? *Annals of Tourism Research* 23: 449 – 462.

Shain, F. and Gleeson, D. 1999. Under new management: changing conceptions of teacher professionalism and policy in the further education sector. *Journal of Education Policy* 14 (4): 445-462.

Siegel, S. 1956. *Nonparametric Statistics for the Behavioural Sciences*. McGraw-Hill Kogakusha Ltd, Tokyo.

Simmons, D. 1996. Teaching in Natural Areas: what urban teachers feel is most appropriate. *Environmental Education Research* 2(2): 149-157.

Simmons, D. 1998. Using natural settings for environmental education. Perceived benefits and barriers. *Journal of Environmental Education* 29(3): 23-31.

Simmons, D. and Young, C. 1991. The role of training in teachers' participation in environmental education. IN: J. Baldwin (ed.). *Proceedings of the North American Association of Environmental Education Conference* (pp. 180-185). Troy, OH:NAAEE.

Singer, R. and Fuller, A.O. 1962. The geology and description of a fossiliferous deposit near Zwartklip near False Bay. *Transactions Royal Society of South Africa* 36: 205-211.

Soto, B., Munthali, S.M. and Breen, C. 2001. Perceptions of the Forestry and Wildlife Policy by the local communities living in the Maputo Elephant Reserve, Mozambique. *Biodiversity and Conservation* 10: 1723 – 1738.

Spinage, C. 1998. Social change and conservation misrepresentation in Africa. *Oryx* 32: 265-276.

Spinage, C. 2002. A reply to Adams and Hulme. *Oryx* 36: 16-7.

Spork, H. 1992. Environmental Education. A mismatch between theory and practice. *Australian Journal of Environmental Education* 8: 147-163.

Stanvliet, R., J. Jackson, G. Davis, C. de Swardt, J. Mokhoele, Q. Thom, and B.D. Lane. 2004. The UNESCO Biosphere Reserve Concept as a Tool for Urban Sustainability: The CUBES Cape Town Case Study. In: Alfsen-Norodom, C., Lane, B.D. and M. Corry. *Urban Biosphere and Society: Partnership of Cities. Annals of the New York Academy of Sciences* 1023: 80-104.

StatSoft, Inc. 2000. STATISTICA for windows. Tulsa, UK.

- Steiner, A. 2003. "Trouble in paradise". *New Scientist* 180 (2417): 21.
- Stenhouse, L. 1978. Case study and case records: Towards a contemporary history of education. *British Educational Research Journal* 4(2): 21-39.
- Stern, P., Dietz, T. & Kalof, L. 1993. Value orientations, gender, and environmental concerns. *Environment and Behaviour* 25: 322-348.
- Stocking, M. and Perkin, S. 1992. Conservation-with-developments: an application of the concept in the Usambara Mountains, Tanzania. *Transactions of the Institute of British Geographers N.S.* 17: 337-349.
- Strauss, A. and Corbin, J. 1990. *Basics of Qualitative Research. Grounded theory procedures and techniques*. London: Sage.
- Studsrod, J.E. & Wegge, P. 1995. Park-people relationships; the case of damage caused by park animals around the Royal Bardia National Park, Nepal. *Environmental Conservation* 22: 133-42.
- Sudman, S. & Bradburn, N.M. 1983. *Asking Questions*. Jossey-Bass Publishers, San Francisco.
- Swartz, K. 1994. Missing boy identified as another victim. *The Argus* (Cape Town), 28 January 1994.
- Tal, R. 2004. Community-based environmental education – a case study of teacher-parent collaboration. *Environmental Education Research* 10(4): 523-543.
- Taylor, J. 1995. Share-Net: *Case Studies in a Risk Society*. FRD Research Report: Umgeni: Wildlife Society Extension Service.
- Terbourge, J. 1999. *Requiem for Nature*. Washington, DC: Island Press/ Shearwater Books.
- Terbourge, J., Van Schaik, C., Davenport, L. & Rao, M. 2002. *Making Parks Work: Strategies for Preserving Tropical Nature*. Washington, DC, USA: Island Press.
- Terre Blanche, M. and Kelly, K. 1999. Calling it a day: Researching conclusions in qualitative research. In Terre Blanche, M. & Durrheim, K. (eds.) (1999). *Research in practice. Applied methods for the Social Sciences*. Cape Town: University of Cape Town Press.
- Terry, A. 2000. An early glimpse: Service learning from an adolescent perspective. *Journal of Secondary Gifted Education* 11: 115-136.
- Tesch, R. 1989. Planning Qualitative Research: How much can be done in advance? Paper presented at the Annual Convention of the American Educational Research Association, March 1989, San Francisco, California.
- Toffar, 1997. Committee to put Wolfgat on the eco-tourist map. *The Plainsman*. (Cape Town). 22 January 1997.
- Tranel, M.J. 2000. Incorporating non-material values in wilderness planning for Denali National Park and Preserve, Alaska, USA. Non-material values of protected areas. *Parks* 10 (2): 35-48.
- Trzyna, T. 2001. California's urban protected areas: progress despite daunting pressures. In:

McNeely, J.A. (ed.) Cities and Protected Areas. *Parks* 11 (2): 4 – 15.

Trzyna, T (ed.). 2005. The Urban Imperative. California Institute of Public Affairs, Sacramento, California. 168 pp.

Turpie, J.K., Heydenrich, B.J., Lamberth, S.J. 2003. Economic value of terrestrial and marine biodiversity in the Cape Floristic Region: implications for defining effective and socially optimal conservation strategies. *Biological Conservation* 112: 233-251.

UNEP. 1988. *People, Parks and Wildlife: Guidelines for Public Participation in Wildlife Conservation, Case Studies in Kenya*. UNEP, Nairobi.

UNEP-WCMC, 2001. *GEO3. Protected Areas Snapshot*. United Nations Environment Programme – World Conservation Monitoring Centre. [HTTP://VAHALLA.UNEP-WCMC.ORG/ISDB/GEO3.CFM](http://www.unep-wcmc.org/isdb/gEO3.cfm) [Geo-2-053].

UNEP. 2002. *Global Environmental Outlook: Past, Present and Future Perspectives*. Earthscan. United Nations, 1992.

UNESCO-UNEP. 1978. The Tbilisi Declaration. *Connect* 3 (1): 1-8.

UN (United Nations Population Division). 2004. UN report says world urban population of 3 billion today expected to reach 5 billion by 2030. Press release, 24 March 2004. United Nations, New York. <http://www.unpopulation.org>.

Uniyal, V.K. and Zacharias, J. 2001. Periyar Tiger reserve- building bridges with local communities for biodiversity conservation. In: MacKinnon, K. (ed.) *ICDPS: Working with Parks and People*. *Parks* 11(2): 14-23.

Uzzel, D. 1994. Children as catalyst of environmental change. Research on economic and social aspects of the environment (SEER I): European Commission Directorate General for science research and development. Joint Research Centre, DGXII/D-5, University of Surrey, U.K.

Van den Born, R. J. G., Lenders, R.H.J., de Groot, W.T. & Huisman, E. 2001. The new biophilia: an exploration of visions of nature in Western countries. *Environmental Conservation* 28: 65-75.

Van Harmelen, U. 1999. Where has all the geography gone? A social constructivist perspective of Curriculum 2005. *South African Geographical Journal* (Special Issue). 81(2): 80-85.

Van Rensburg, T.F.J. 1987. An introduction to fynbos. Bulletin 61, Department of Environmental Affairs and Tourism, Pretoria.

Van Wilgen, B.W., Le Maitre, D.C., Cowling, R.M. 1998. Ecosystem services, sustainability and equity: South Africa's Working for Water Programme. *Trends in Ecology and Evolution* 13:378.

Venter, A. Marias, C and Breen, C. 1994. Kruger National Park: managing for the future: integrating the goals of conservation and the development of local communities. Occasional Paper No. 149, Institute of Natural Resources, University of Natal, Pietermaritzburg, South Africa: 8 pp.

Vierros, M. and Barber, C.V. 2003. Protected areas and the conservation and sustainable use of biological diversity. The Secretariat of the Convention on Biological Diversity. Ad Hoc Technical Paper. Tjarno, Sweden.

Vulliamy, G., Lewin, K. and Stephens, D. 1990. *Doing Educational Research in Developing Countries: Qualitative Strategies*. London: Falmer Press.

Wagiet, R. 1991. A critical analysis of aspects pertaining to the teaching of ecology in the Std. 8 biology syllabus. M.Phil. Thesis. University of the Western Cape, Cape Town.

Wagiet, M.F. 1996. Teaching the principles of ecology in the urban environment.: an investigation into the development of resource materials. Unpublished Master of Education Thesis. Grahamstown: Rhodes Univesity.

Wals, A. 1993. Critical phenomenology and environmental educational research. In Mrazek, R. (Ed.). *Alternative Paradigms in Environmental Educational Research*. Ohio. NAAEE.

Wals, A., Beringer, A. and Stapp, W. 1990. Education in action. A community problem-solving program for schools. *Journal of Environmental Education* 21(4): 13-20.

Warr, M. 1985. Fear of rape and crime among urban women. *Social Problems* 32 (3): 238-250.

Weaver, D.B. 1991. Alternatives to mass tourism in Dominica. *Annals of Tourism Research* 18: 414 – 432.

Weber, A.W. 1987. Socio-ecological factors in the conservation of the Afromontane forests reserves. In: *Primate Conservation in Tropical Rain Forests*. Eds.. J.S. Gartlan, C.W. Marsh and R.A. Mittermeier. Alan R. Liss, New York, pp. 205-29.

Weladji, R.B., Moe, S.R. and Vedeld, P. 2003. Stakeholder attitudes toward wildlife policy and the Benoue Wildlife Conservation Area, North Cameroon. *Environmental Conservation* 30(4): 334-343.

Weladji, R.B. & Tchamba, N.M. 2003. Conflict between people and protected areas within the Benoue Wildlife Conservation Area, North Cameroon. *Oryx* 37: 72-79.

Wells, M.P. 1993. Neglect of biological riches: the economics of nature tourism in Nepal. *Biodiversity and Conservation* 2: 445 – 464.

Wells, M. and Brandon, K. 1992. *People and Parks: Linking protected area management with local communities*. Washington, D.C. The World Bank, WWF, and USAID.

Wells, M.K., Brandon, K. and Hannah, L. 1992. People and Parks. Linking protected area management with local communities. World Bank, World Wildlife Fund, US Agency for International Development, Washington, D.C.

Wells, M.K. 1995. Biodiversity conservation and local development aspirations: new priorities for the 1990's. In: *Biodiversity Conservation: Policy issues and Options*, (Ed.) C. Perrings, K.G. Maler, C. Folke, C.S. Holling & B.O. Jansson, pp. 319-34. Dordrecht, The Netherlands: Kluwer Academic Press: xvi + 404pp.

Wells, M.K. 1996. The social role of protected areas in the new South Africa. *Environmental Conservation* 23 (4): 322-331.

West, P.C. & Brechin, S.R. 1991. National Parks, protected areas, and resident peoples: a comparative assessment and integration. Pp. 363-400. In: *Resident Peoples and national*

Parks: Social dilemmas and Strategies in International Conservation (Eds P.C. West & S.R. Brechin). The University of Arizona Press, Tuscon, Arizona, USA.

Western, D. 2001. Taking the broad view of conservation: a response to Adams and Hulme. *Oryx* 35: 201-203.

Western, D. and Wright, R.M. 1994. *Natural Connections: Perspectives in Community-based Conservation*. Tuscon: University of Arizona Press.

Western, D., Wright, M. and Strum, S.C. 1994. *Natural Connections: Perspectives in Community-based Conservation*. Washington, D.C. Island Press.

White Paper on Education. 1995. National Ministry of Education in the Government of National Unity. Pretoria, RSA.

Wilkie, D.S., Carpenter, J.F. and Zhang, Q. 2001. The under-financing of protected areas in the Congo Basin: so many parks and so little willingness to pay. *Biodiversity and Conservation* 10: 691-709.

Wilmot, D. 2000. Making issue-based enquiry a reality in South African classrooms through co-operative fieldwork. In: W.A. Kent and S. Jackson (eds). *Geography and Environmental Education: International Perspectives* (pp. 126-33). London: Institute of Education, University of London.

Wilmot, D. 2004. Emerging models of teacher training: The case of South Africa. *International Research in Geographical and Environmental Education* 13(2): 153-158.

Wilshusen, P., Brechin, S., Fortwangler, C. & West, P. 2002. Reinventing a square wheel: Critique of a resurgent "protection paradigm" in International Biodiversity Conservation. *Society and Natural Resources* 15: 17-40.

Wilson, J.Q. & Kelling, G. 1982. Broken windows. *Atlantic Monthly* 211: 29-38.

Winter, R. 1987. *Action Research and the Nature of Social Enquiry: Professional Innovation and Educational Work*. Aldershot: Avebury.

Winter, R. 1989. *Learning from Experience: Principles and Practice in Action Research*. London: Falmer Press.

Wood, J. Low, A.B., Donaldson, J.S. & Rebelo, A.G. 1994. Threats to plant species diversity thorough urbanization and habitat fragmentation in the Cape Metropolitan Area, South Africa. In B.J. Huntley, Botanical Diversity in southern Africa. *Strelitzia* 1: 259 – 274. National Botanical Institute, Pretoria.

Wood, J. 1996. Discovering Wolfgat Nature Reserve. Parks and Forest Branch, City Engineers Department. City of Cape Town. 44pp.

World Conference on Education for All. 1990.

World Wildlife Fund (WWF), 2005. Marine protected areas: Providing a future for fish and people. 20 pp. Gland, Switzerland.

WWF and IUCN, 1994. Centres of Plant Diversity: A Guide and Strategy for their Conservation. Cambridge, IUCN Publications Unit.

APPENDICES



APPENDIX 1. Universe for Community Leaders randomly chosen from a list of 112 community-based organizations provided by the local Reconstruction and Development Forum and the City of Cape Town.

NO	NAME	ORGANISATION	CATEGORY	ROLE
1	Daniel Louw	Amfat Neighbourhood Watch	Community based/ Civic Organization	Chairperson
2	Arthur Booysen	Beacon Crime Prevention	Community based/ Civic Organization	Co-ordinator
3	Laura Muller	Beacon Valley Information Centre	Community based/ Civic Organization	Chairperson
4	Mr.DuToit	Board of Trustees of the Woodlands Residents	Community based/ Civic Organization	Chairperson
5	Julian Banton	Colorado Residents Association	Community based/ Civic Organization	Chairperson
6	Sheval Aranda	Crime Watch Committee	Community based/ Civic Organization	Chairperson
7	Y. Burties	CROMP	Community based/ Civic Organization	Chairperson
8	Rhoda Oosthuizen	Eastridge Women's Empowerment Project	Community based/ Civic Organization	Chairperson
9	Vera Scharneck	Eastridge/Beacon Valley Residents' Association	Community based/ Civic Organization	Chairperson
10	Mr. Isaacs	Ghost Town Rate Payers	Community based/ Civic Organization	Chairperson
11	Mr. McCaughlin	Helpmekaar Belastingbetalers Association	Community based/ Civic Organization	Chairperson
12	Mr.Windvogel	Kapteinship Civic Association	Community based/ Civic Organization	Chairperson
13	Dr.Dudlow	Koimima	Community based/ Civic Organization	Chairperson
14	Tony Jansen	Lentegur & Beacon Valley Residents Association	Community based/ Civic Organization	Chairperson
15	Rev.Wilhelm Schoepers	Lentegur Civic Association	Community based/ Civic Organization	Councillor
16	Mrs Abrahams	Lentegur Projects	Community based/ Civic Organization	Chairperson
17	Riedwaan Athony	London Residents Association	Community based/ Civic Organization	Chairperson
18	Jasmin Jacobs	Lost City Area Civic Association	Community based/ Civic Organization	Chairperson
19	Mr.Loveriot	Lost City Neighbourhood Watch	Community based/ Civic Organization	Chairperson
20	Eleanor Sonnenberg	Love in Action	Community based/ Civic Organization	Chairperson
21	Senator Fisher	Mitchells Plain Ratepayers Association	Community based/ Civic Organization	Chairperson
22	Abraham Pfeiffer	Mitchells Plain Police Forum	Community based/ Civic Organization	Chairperson
23	Rachart Job	Mitchells Plain Youth Development Programme	Community based/ Civic Organization	Chairperson
24	Beverly Mills	Mitchells Plain Youth Development Programme	Community based/ Civic Organization	Co-Coordinator
25	Norman Jantjes	National Institute of Crime and Rehabilitation of Offenders	Community based/ Civic Organization	Chairperson
26	Wajdi Abrams	National Institute of Crime and Rehabilitation of Offenders	Community based/ Civic Organization	Co-ordinator
27	Walood George	National Institute of Crime and Rehabilitation of Offenders	Community based/ Civic Organization	Co-ordinator
28	Maxwell Van Rooyen	New Tafelsig Youth League	Community based/ Civic Organization	Chairperson
29	Councillor Hermeline	Outreach for the disabled	Community based/ Civic Organization	Chairperson
30	Margaret Meyer	Phakamani Project	Community based/ Civic Organization	Chairperson
31	Mrs Salie	Portlands Residents Association	Community based/ Civic Organization	Chairperson
32	Oscar Solomons	Rocklands Ratepayers Organization	Community based/ Civic Organization	Chairperson
33	Abdul Salie	Rockwest Neighbourhood Watch	Community based/ Civic Organization	Chairperson
34	Anwaar Sachalla	Searidge Park Civic Association	Community based/ Civic Organization	Chairperson
35	Lionel Happets	Snowdes Civic Association	Community based/ Civic Organization	Chairperson
36	Margaret Japha	Snowdon Civic Association	Community based/ Civic Organization	Co-Chairman
37	George Rhoda	Snowdown Civic Association	Community based/ Civic Organization	Co-ordinator
38	Ms Swartz	South African Democratic Workers' Union	Community based/ Civic Organization	Co-ordinator
39	Tandiswa Smile	South African National Civics Organization - Tafelsig	Community based/ Civic Organization	Chairperson
40	Hilton Tito	South African National Civics Organization - Colorado	Community based/ Civic Organization	Chairperson
41	Ms Booysen	South African National Civics Organization - Mitchell's Plain	Community based/ Civic Organization	Chairperson
42	Lynette Coetzee	Strandfontein Civic Association	Community based/ Civic Organization	Chairperson
43	Denzil Stober	Strandfontein Rate Payers	Community based/ Civic Organization	Chairperson
44	Felicia Stober	Sugarloaf Rate Payers	Community based/ Civic Organization	Chairperson
45	Brenda Masingaba	Tafelsig Action Committee	Community based/ Civic Organization	Chairperson
46	Mr.Bryden	Western Cape Civic Alliance	Community based/ Civic Organization	Chairperson
47	Ceejay Williams	Westridge Civic Association	Community based/ Civic Organization	Co-chairperson
48	Colin Walters	Westridge Residents Association	Community based/ Civic Organization	Chairperson
49	Gilbert Kruger	Westridge Sports Board of Control	Community based/ Civic Organization	Chairperson
50	I. Ramedies	Wimbleton Civic Association	Community based/ Civic Organization	Chairperson
51	Sandra Van Dalen	Wolfsig Management Committee	Community based/ Civic Organization	Chairperson

NO	NAME	ORGANISATION	CATEGORY	ROLE
52	Mrs. Moor	Mitchells Plain Educare Association	Education	Chairperson
53	Tyron Humphries	Wolfsat Teachers Forum	Education	Co-Chairperson
54	Mr. Julius	Afrikaanse Christelike Vroue Vereniging	Health and Welfare	Chairperson
55	Mrs. Jansen	Amenities of Health	Health and Welfare	Chairperson
56	Magda Dreyer	Beacon Valley Health Committee	Health and Welfare	Chairperson
57	Mr. Hendricks	Beaconvale Community Home	Health and Welfare	Chairperson
58	Farieda Karriem	Best Pals Senior Citizens Club	Health and Welfare	Chairperson
59	Dawn Adams	Crises Line Focus on Women's Issues	Health and Welfare	Co-ordinator
60	Mogamat Sampson	Islamic Society	Health and Welfare	Chairperson
61	Darlene Tyawana	Khaya Daycare Centre	Health and Welfare	Chairperson
62	Mrs. Stakala	Lentegour Health Committee	Health and Welfare	Chairperson
63	Marjory Jones	M.P Disability Action Group	Health and Welfare	Chairperson
64	Mrs. Jackson	Mitchells Plain Feeding Scheme	Health and Welfare	Chairperson
65	David Sampson	Mitchells Plain Health Committee	Health and Welfare	Chairperson
66	Daniel Rasm	Mitchells Plain Sports & Recreation Council	Health and Welfare	Chairperson
67	Mrs. Apple	Portlands Health Committee	Health and Welfare	Chairperson
68	Mr. Jacobs	Protes Voluntary Welfare Association	Health and Welfare	Chairperson
69	Mev. De Swart	Red Cross Local Committee	Health and Welfare	Chairperson
70	Rochana Kemp	South African National Cancer Association	Health and Welfare	Co-ordinator
71	Felicia Stobes	Strandfontein Health Forum	Health and Welfare	Chairperson
72	Frank Kriel	Area L. Business Association	Local Business	Chairperson
73	Ziad Ali	Mitchells Plain Garments Association	Local Business	Chairperson
74	Anwar Carr	Mitchells Plain Hawkers Association	Local Business	Chairperson
75	Mr. Kolbee	Mitchells Plain Motoring Trade	Local Business	Co-Chairman
76	Mr. Brinkhuis	Mitchells Plain Stallholders Association	Local Business	Chairperson
77	Mr. Ebrahim	Mitchells Plain Town Centre Merchants Association	Local Business	Chairperson
78	Ernest Sonnenberg	African Christian Democratic Party	Political	Chairperson
79	Jeremiah Thyma	African National Congress	Political	Chairperson
80	Dilsheed De Vries	African National Congress -Eastridge branch	Political	Chairperson
81	Terese Solomon	African National Congress -Mayor of Cape Town	Political	Mayor of Cape Town
82	L. Swartz	African National Congress -Member of Parliament	Political	Member of Reconstruction and Development Programme
83	Mandisa Danywa	African National Congress -Tafelsig branch	Political	Chairperson
84	C. Williams	African National Congress -Westridge branch	Political	Councillor
85	Rev. Pascoe	Independent Party	Political	Councillor
86	Mrs. Lombard	Inkatha Freedom Party - Mitchells Plain	Political	Chairperson
87	Reginald Roberts	Inkatha Freedom Party - Tafelsig	Political	Chairperson
88	Willie Summers	Mitchells Plain Advice Centre	Political	Co-ordinator
89	Mrs. Myberg	National Party	Political	Councillor
90	Mrs. Herandine	National Party - Strandfontein	Political	Councillor
91	Bernard Clark	National Party (Mitchells Plain Zone)	Political	Chairperson
92	Mr. George	National Party (Mitchells Plain Zone)	Political	Councillor
93	Rev. Bantam	National Party (Mitchells Plain Zone)	Political	Councillor
94	Mrs. Myburgh	National Party -Ward 24	Political	Chairperson
95	Mrs. Gertze	National Party Womens League (central)	Political	Chairperson
96	Mrs. Clinton	New Lentegour National Party	Political	Chairperson
97	Mr. Roman	Pan African Congress	Political	Chairperson
98	Peter Duijker	Tafelsig Advice Office (African National Congress)	Political	Chairperson
99	Shameel Manie	Call of Islam	Religious	Chairperson
100	Rev. Busch	Mitchells Plain Fraternal	Religious	Chairperson

APPENDIX 2. Letter sent to community leaders requesting their participation in the survey.



"The Mission of the Institute for Plant Conservation is to develop & communicate a biological understanding of the flora and vegetation of the Cape Floristic Region in order to promote the sustainable use of this unique asset by all."

21 February 1996

Dear

SURVEY OF ATTITUDES TOWARD THE UTILIZATION OF WOLFGAT NATURE RESERVE

I am analyzing the attitudes of **community leader and residents** toward the utilization of the Wolfgat Nature Reserve, which is situated between Mitchell's Plain and False Bay. The research is for the degree, Doctor of Philosophy, through the Institute of Plant Conservation, in the Botany Department, at the University of Cape Town.

You are one of the **select group of community leaders** requested to express his/ her views on the utilization and conservation of the Wolfgat Nature Reserve.

In order for this survey to have academic credibility, it is essential that the maximum number of people respond, so that findings may be representative of community leaders in your area. For this reason, I would appreciate it if you would permit me to interview you on your views. The interview will take approximately one hour. Your views will be strictly confidential (i.e. no information will be traced back to any individual).

Please indicate via the enclosed reply slip when it would be convenient for you to be interviewed during April or May 1996. If so, could you please indicate two suitable dates, and the time and venue. I shall confirm the date, time and venue when I receive your return post. Please note that any time which you accept shall be in order, be it during office hours, an evening or over a weekend.

Please send your reply in the return self-addressed envelope at your earliest convenience to:
Theo Manuel, c/o Botany Department, University of Cape Town, Private Bag, Rondebosch, 7700
Tel: 650-2448 (w); 637-9724 (h) – Fax: 650-4041.

Yours faithfully

.....
Theo Manuel



Department of Botany, University of Cape Town
Private Bag, Rondebosch, 7700, South Africa
Telephone: (021) 650 2440, Fax (021) 650 4046

APPENDIX 3: Example of a graphical set of cards used by the researcher during the interview process in the study on residents and community leaders; and adjacent communities of Tafelsig and Harare. Set of cards shown below was used in Section B, Question B1c, which refers to "If Wolfgat remains as it is:- What are the drawbacks (if applicable) that would keep you from using the reserve?"



APPENDIX 4. Community survey questionnaire.

ATTITUDES AND USAGE PREFERENCES OF RESIDENTS AND COMMUNITY LEADERS TO THE UTILISATION OF WOLFGAT NATURE RESERVE

This research is being undertaken as part of a Doctor of Philosophy degree through the
Institute for Plant Conservation
Department of Botany
at the
University of Cape Town

The questionnaire explores some of the options for the utilisation of the Wolfgat Nature Reserve.

Community Leaders are taken to be those who are chairpersons of a community-based organisation.

Pilot testing has indicated that it will take approximately
1 hour 30 minutes to complete the questionnaire.

Respondents in many attitudinal surveys feel that they have to give answers to please the interviewer and say what the interviewer would like to hear. This weakens the effectiveness of the survey if respondents do not express their genuine feelings.

The academic credibility of this research thus depends on
your honest answers.

Name:

Organisation:

Date:

Time taken: to

THANK YOU

THEO MANUEL

SECTION A: RELATIONSHIP OF RESPONDENT TO WOLFGAT

Please elaborate whenever you feel this will clarify your answers OR Please tick the box next to your chosen answer.

A1. What are the important things to you to ensure a good quality of life? OPEN RESPONSE - IF RESPONDENT STRUGGLES, PROVIDE CARDS

.....
.....

Note: Cards are generated. Generated cards, together with cards already produced, ask the next question.

A2. Use the cards and place the items in order of importance from most important to least important.

Relates to: 1. Employment ... 2. Education ... 3. Food ... 4. Housing ... 5. Transport ... 6. Security ...
... 7. No Violence ... 8. No Gangsterism ... 9. Religion ... 10. 11. 12.
..... 13. 14.

A3. Indicate how important each of these items are, by giving each a number between 1 and 10. Use the diagram to assist you.



Relates to: 1. Employment ... 2. Education ... 3. Food ... 4. Housing ... 5. Transport ...
6. Security... 7. No Violence ... 8. No Gangsterism ... 9. Religion ... 10.
11. 12. 13. 14.

A4. If we had to add Wolfgat Nature Reserve, to ensuring a good quality of life; to the cards in A2. HAND CARDS AGAIN TO RESPONDENT.

a) At what point in the sequence would you place it?

b) In terms of its importance as in A3, what number would you give it?

A5. Considering the items you chose in A1, if the local authority (council) had more money, on what should they spend the money? (indicate most to least important). HAND CARDS OF A2 TO RESPONDENT.

.....

A6. Were you aware of the existence of Wolfgat Nature Reserve before this interview?

YES NO

A7. If yes, how did you first become aware? (INTERVIEWER TICK THE MENTIONED SOURCE/S).

Relates to: 1. Newspapers ... 2. School Activities ... 3. Friends... 4. Community radio ... 5. TV ...

6. Other (please specify)
.....

A8a). Have you ever visited Wolfgat?

Yes ... No ... (For what reason?)

IF NO, GO TO A9.

Relates to: 1.Angling ... 2.Birdwatching ... 3.Environmental Education ... 4.Picknicking ... 5.Watching the Scenery ... 6.Swimming ... 7.Walking/Exercise ... 8.Spend time with family ... 9.Other

A8b) If yes, during what periods of the year do you most often visit Wolfgat?
.....

A8c) If yes, how often do you visit Wolfgat? --
(number of times =).

- A) Often (more often than twice/month) ...
- B) Regular (once/month) ...
- C) Occasionally (once every 3 months) ...
- D) Infrequently (once or twice a year) ...
- E) Once only ...

A9. Do you think there should be a place such as Wolfgat?

YES ... NO ...

Please explain your answer:
.....

A10. Which of the following uses, if any, do you have for veld plants?

- 1.Nothing ... 2.Gardening ... 3.Flower arranging ... 4. Medicines ... 5.Enjoying nature ...
- 6.Other.....

A11. Do you know the names of:

Any Veld plants in Wolfgat?

Yes ... No ...

* Name them.

Animals in Wolfgat?

Yes ... No ...

* Name them.

A12. Consider the following statements below. "Please indicate if you Strongly agree, Agree, Neutral, Disagree, Strongly disagree. There are no right or wrong answers. CIRCLE THE PREFERRED OPTION

a) If people should support the conservation of Wolfgat, then it should improve the quality of their lives.

SA A N D SD.

b) It is likely that the environment and Wolfgat could suffer if community leaders do not communicate these matters to residents.

SA A N D SD.

A13. Do you think Wolfgat has any potential to improve the quality of your life?

Yes No

* IF YES, how? IF NO, why do you say so?
.....

A14. What do you understand by the term conservation as applies to the social quality of life?
.....

A15. Consider the following:

a) What makes Wolfgat important to you at the moment? [In other words, what value do you see in Wolfgat]HAND CARDS TO RESPONDENT TO RANK CARDS-- WHEN COMPLETE, QUESTION b).

b) What is the importance of Wolfgat in the future? (specifically, in 5 years time)

*RESPONDENT MAY CHOOSE MORE THAN ONE ANSWER

	PRESENT	FUTURE
1. Part of our history
2. Birds
3. Lots of plants
4. Place for wild animals
5. Insects
6. Buffer zone between sea and houses
7. It's our only nature reserve
8. Heritage for future generations
9. For Scrambling
10. Cycling
11. For Recreation(Walking/Relaxation)
12. For Education
13. Pick flowers
14. Pick Herbs
15. Firewood
16. Jobs
17. Tourism
18. Religious
19. Other – specify ()
Elaborate if required:	

A16. Has Wolfgat had any impact on your life, or those in your community?

YES NO

Please explain your answer:

.....

A17. In your opinion, can Wolfgat help to improve the quality of life in your community?

YES ... NO ...

Explain your answer:

A18. How concerned do you think Community Leaders are about the natural environment in your community?
SPONTANEOUS RESPONSE REQUIRED.

Weak Concern ... Fairly Weak Concern ... Some Concern ...Fairly Strong Concern ... Strong Concern ...

A19. How concerned do you think Residents are about the natural environment in your community?

Weak Concern ... Fairly Weak Concern ... Some Concern ...Fairly Strong Concern ... Strong Concern ...

SECTION B: UTILISATION

CONSIDER THE FOLLOWING:

B1. IF WOLFGAT IS TO REMAIN AS IT IS.

(The only facilities that exist are paths).

a) How often would you use it in the future? TICK THE ANSWER

A) Never ...

IF NEVER, GO TO B1c)

B) Infrequently (once or twice a year) ...

C) Occasionally (once every two to four months) ...

- D) Often (once to three times per month) ...
E) Very Often (at least once a week) ...

b) If positive to a), why would you want to use the reserve as it stands at the moment?

.....

c) What are the drawbacks (if applicable) that would keep you from using the reserve? IF HAVE DIFFICULTY, GO TO NEXT PAGE, SUPPLY CARDS AND RANK. (Please rank in order of importance 1 to 7).

.....

If difficult: CARDS AND RANK.

Relates to: 1.Dangerous gangs/crime ... 2.Lack of patrols ... 3.Reserve is bush ... 4.Belongs to City Council, not us ... 5.Lack of information ... 6. Rubbish dumping ... Other: 7.....
8..... 9..... 10.....

Please elaborate on any of the above:

.....

.....

d) Do you think the three most important drawbacks you chose in b) could be solved?

YES NO

Why do you say so?

.....

B2. WOLFGAT IS TO BE UPGRADED AS A NATURE RESERVE.

a) If you were a planner, what environmental uses, would you use Wolfgat for? Rank your answers in order of importance, from 1 - 8. INTERVIEWER SUPPLY CARDS.

Birdwatching ... Environmental Education ... Fishing ... Picknicking ...
Protection of Nature ... Recreation (walking/swimming) ...
Relaxation/Scenery ... Other (please specify)

b) What uses other than environmental, would you use Wolfgat for? Rank the uses in order of importance FROM 1 - 9. INTERVIEWER SUPPLY CARDS.

Playpark ... Golf Course ... Caravan Park ... Housing Development ... Soccer Field ...
Initiation Area ... Camp site ... Ecotourism ... Other (please specify)

c) What facilities must be developed at Wolfgat to encourage your usage of the area, if kept as a nature reserve?

.....

d) How could these facilities benefit the community?

.....

e) Given your answers in d) how often would you use it in the future?

- A) Never ...
B) Infrequently (once or twice a year) ...
C) Occasionally (every two to four months) ...
D) Often (once to three times per month) ...
E) Very Often (at least once per week) ...

f) What factors should be checked to encourage your ongoing usage? (Please rank in order of importance 1 to 7). SUPPLY CARDS

1. Ongoing information ...
2. Guides ...
3. Regular patrols ...
4. Crime ...
5. Pollution/dumping ...
6. Physical ability to walk around easily ...
7. Other: (please specify) :

SECTION C: GENERAL VIEWS TOWARDS WOLFGAT AND ITS UTILISATION

B1. If you had to vote on the following issues, how would you react. Will you tell me whether you - Strongly Agree - Agree - Neutral - Disagree - Strongly Disagree, with these statements. Remember, there are no right or wrong answers. CIRCLE THE CORRECT OPTION.

COMMENTS

People in our community should be allowed to harvest wildflowers from Wolfgat if a licence is obtained.

SA. .A.. .N.. .D.. .SD

In the future, users should pay an admission fee, if it is to help with the upkeep of Wolfgat.

SA. .A.. .N.. .D.. .SD

The removal of Wolfgat plants can result in severe sandstorms and wind blowing directly towards Mitchells Plain and Khayelitsha.

SA. .A.. .N.. .D.. .SD

Wolfgat must remain as it is, no upgrading should take place.

SA. .A.. .N.. .D.. .SD

Upgrading of Wolfgat would not necessarily improve the quality of life in our community.

SA. .A.. .N.. .D.. .SD

Residents in the community should pay an extra R1 on their rates monthly if it is to assist with upgrading Wolfgat.

SA. .A.. .N.. .D.. .SD

It is likely that more people will visit Wolfgat if safety patrols are provided.

SA. .A.. .N.. .D.. .SD

If the local authority is to receive money for community development (eg. via the RDP), part of that money should be used to upgrade Wolfgat Nature Reserve.

SA. .A.. .N.. .D.. .SD

Wolfgat is a waste of land, Part of it should be used to build facilities (eg. Gymnasium) for the communities.

SA. .A.. .N.. .D.. .SD

It is likely that tourists who visit Wolfgat could benefit our community.

SA. .A.. .N.. .D.. .SD

It is more important to keep Wolfgat for our children than to develop

facilities on the land.

SA. .A.. .N.. .D.. .SD

It is worth keeping Wolfgat as a nature reserve.

SA. .A.. .N.. .D.. .SD

Leaders in our community do care much for the environment.

SA. .A.. .N.. .D.. .SD

People dumping rubbish in Wolfgat should be punished by either doing community service or paying a fine.

SA. .A.. .N.. .D.. .SD

Even if rooikranz threaten natural plants, rooikrans should be left in certain areas if it provides firewood for people in our community.

SA. .A.. .N.. .D.. .SD

Any general comments/queries?

SECTION D: CONSERVATION OF WOLFGAT IN RELATION TO SOCIO-ECONOMIC DEVELOPMENT OF SURROUNDING COMMUNITIES

Background Information SHOW MAP - EXPLAIN AND READ TEXT

Wolfgat Nature reserve is situated between Mitchells Plain and the False Bay coastline. The second largest nature reserve on the Cape Flats, it protects rare coastal fynbos and strandveld. It contains close to 200 plant species, many

animals such as grysbok and steenbok, many bird species and insects. It is the only place on the mainland where the

Kelp Gull breeds. It provides breathtaking scenery and whales can be seen visiting False Bay in Spring. The cliffs also

provide a record of how the Cape Flats appeared thousands of years ago. With these attributes, the reserve has educational, recreational and tourism potential for the surrounding communities. The plants in Wolfgat have become

threatened by invasive alien plants and the dumping of rubbish decreases the attractiveness of the area. Efforts to clear

alien plants have taken place and children of local schools are using the reserve as an outdoor classroom at present.

D1. Consider the following:

If the RDP office granted R1m for development in the region, how would you spend the money between the options given to you?

SUPPLY CARDS. FAMILIARISE RESPONDENT WITH CARD OPTIONS. SUPPLY ONE EXTRA BLANK CARD IF AN OPTION IS ADDED BY RESPONDENT. SUPPLY MONOPOLY MONEY TO RESPONDENT. RESPONDENT LAYS OUT CARDS IN RANKED ORDER. THIS IS FOLLOWED BY THE RESPONDENT ALLOCATING MONEY TO CHOSEN OPTIONS.

	OPTION	AMOUNT	RATING (ADD AFTERWARDS)
1. Housing	R .....	.....
2. Education	R .....	.....
3. Wolfgat Conservation	R .....	.....
4. Fighting crime	R .....	.....
5. Job creation	R .....	.....
6. Transport	R .....	.....
7. Health & Welfare	R .....	.....
8. Food for needy	R .....	.....
9. Building materials	R .....	.....
10. Religious buildings	R .....	.....
11. Burial grounds	R .....	.....
12. Small business creation	R .....	.....
13. Ecotourism	R .....	.....

Note: Where does Wolfgat end up relative to the others?

D2. Why did you sequence it like this?

.....

D3. Which options can Wolfgat help to address? SAME CARDS!
(please rank in order of importance 1 to 5)

1. 2. 3.
4. 5.

D4. How could Wolfgat address these factors mentioned in D3?

1.
2.
3.
4.
5.

D5. Show me how your sequence you chose in D1, would change in 5 years time. CARDS WITH
INTERVIEWER RECORDING

.....

D6. Why did you sequence it like this?

.....

SECTION E: CO-OPERATION AND COMMUNICATION AFFECTING THE FUTURE OF THE RESERVE.

E1. Who do you think owns Wolfgat Nature Reserve?

.....

Relates to: 1. Government ... ' 2. City Council ... 3. People of the community ...
4. Whites ... 5. Law enforcement ... 6. 7. 8. Don't know ...

E2. What does City Council (officials) do in Wolfgat?

Give your response to the following questions. Afterwards, let us consider : a) how well it is done and
b) how important is it that it is done.

DO YOU FEEL THEY:

	YES	NO	DON'T KNOW
a) Keep the area clean
b) Protect citizens from criminals
c) Protect plants and animals
d) Prevent hunting in the area
e) Attract tourists to the area
f) Keep people from using the area.

By circling the preferred option, tell me whether they do it - VERY WELL, WELL, FAIR, POORLY or VERY POORLY.

a) Keep area clean	VW	W	F	P	VP
b) Protect citizens from criminals	VW	W	F	P	VP

c) Protect plants and animals	VW	W	F	P	VP
d) Prevent hunting in the area	VW	W	F	P	VP
e) Attract tourists to the area	VW	W	F	P	VP
f) Keep people from using the area	VW	W	F	P	VP

By circling the preferred option, tell me how important it is that this be done either - VERY IMPORTANT, IMPORTANT, DON'T KNOW, NOT IMPORTANT or INSIGNIFICANT.

a) Keep area clean	VI	I	DN	NI	INS
b) Protect citizens from criminals	VI	I	DN	NI	INS
c) Protect plants and animals	VI	I	DN	NI	INS
d) Prevent hunting in the area	VI	I	DN	NI	INS
e) Keep people from using the area	VI	I	DN	NI	INS

Is keeping people from using the nature reserve a good or bad thing? GOOD ... BAD ...

Why do you say so?

f) Any other comments concerning City Council officials?

E3. Will you please tell me whether you STRONGLY AGREE, AGREE, DISAGREE, STRONGLY DISAGREE, OR DON'T KNOW, with these statements.

a) In general, there should be adequate communication between community leaders and residents over environmental matters if Wolfgat is to be conserved.	SA	A	D	SD	DN
b) There should be adequate communication between City Council and the community over environmental matters if Wolfgat is to be conserved.	SA	A	D	SD	DN
c) Much more should be done to inform us about how Wolfgat can benefit us.	SA	A	D	SD	DN
d) Businesses in our community must help by giving some money to upgrade Wolfgat	SA	A	D	SD	DN

E4. How would you like read/listen to matters relating to Wolfgat? Please rank the following options by indicating, DEFINITELY, YES, POSSIBLY, NOT REALLY and NOT AT ALL.

Signboards in Public areas	DEF	YES	POSS	NR	NAA
Radio	DEF	YES	POSS	NR	NAA
Pamphlets in letter box	DEF	YES	POSS	NR	NAA
Community Newspapers	DEF	YES	POSS	NR	NAA
Other (specify)	DEF	YES	POSS	NR	NAA

E5. What type of Education Programme would you go to/ read/ listen to, in order to educate the broader public about the potential benefits of Wolfgat? RANK CARDS FROM MOST TO LEAST POPULAR CHOICE

Relates to: 1.Community meetings ... 2.Workshops .. 3.Frequent articles in newspapers ...
4.Radio talkshows ... 5.Pamphlets ... 6..... 7.....

E6. If you are to go to one of these programmes, what would it have to have to make it worthwhile? Please mention from most to least important. If no response, SUPPLY CARDS.

Relates to: 1. 2. 3. 4.....
5. 6..... 7. 8.....

CARDS OPTION

Relates to: 1.Info on skills to manage reserve 2.Educational info. on plants and animals ... 3.Info. on job possibilities ... 4.Info. on issues which affect Wolfgat's value such as pollution. ...
5. How Wolfgat can improve community health ... 6. Other (specify)

E7. Would you be willing to attend a meeting in your area about matters affecting the nature reserve?
YES ... NO ... Why do you say so?

E8. Would you like to become involved in the conservation of Wolfgat?
YES ... NO ... UNSURE ...

What is the reason for your answer?

How do you think you can help?.....

E9. Who do you regard as the leader in your community to speak on your behalf?

Status of the individual in the Community:.....

Relates to: 1. Political ... 2.Ratepayers/Civics ... 3. Religious ... 4. Non-political
5. Educational ... 6. Sport ... 7. 8.

E10. What impact has Wolfgat had on your life thusfar?
.....

E11. In your opinion, to what extent should the community be consulted regarding any future management decisions concerning Wolfgat?

A) Direct consultation with community ... B) Consult our community leaders....
C) No consultation ... D) Consultation via RDP Forum ... E) Other means of consultation (please specify)
.....

SECTION F: BIOGRAPHICAL DATA

All personal details are for statistical analysis, and will also be treated in the strictest confidence.

1. Suburb: 2. Respondent's Tel. No:.....
3. Home Language : English ... Afrikaans ... Bilingual ... Xhosa ... Other
4. Age: years. 5. Gender: Male: ... Female ...

5. Occupation:

Relates to: 1.Scholar ... 2.Student ... 3.Unskilled Worker ... 4.Semi-skilled ...
5.Skilled ... 6.Professional ... 7. Unemployed ... 8.Self-employed ...

6. Period of residence: ... (How long have you lived in MP?)years.

7. Place of previous residence: (Where did you live before?)

8. Reason for moving to the area: (Why did you move from there?)

9. Do you consider Mitchells Plain your home? YES ... NO ... Why do you say so?

10. Education: --> std. 2 ... std. 3-4 ... std. 5-7 ... std. 8-9 ... std. 10 ... Diploma (std.10+3) ...Degree (3years)
... Degree (4years) ... Honours ... Masters ... Doctorate ...

11. Did you study Biology at school or after your schooling? YES ... NO ... Please elaborate if YES:

12. Parents' Education: Mother Father

13. Do you (or a member of your family) belong to an environmental club? YES ... NO ...

If yes, please name the club:

14. Do you read or watch any conservation stories or documentaries. IF NO, GO TO NUMBER 16.

a) Occasionally ... [Specify] b) Regularly ... [Specify]

On Radio: YES ... NO ...

If YES, name them:

On TV: YES ... NO ...

IF YES, name them:

15. Family Income: A) Up to R300 per month B) R301 - R500 per month C) R501 - R800 per month
D) R801 - R1000 per month E) R1001 - R1500 per month ... F) R1501 - R1999 per month
G) R2000 - R3000 ... H) R3001 - R4000 ... I) R4001 - R5000 ...
J) R5001 - R6000 K) Above R6001 (please specify) R.....

16. How many people are dependent on the above income?

17. Assessment of household affluence: RESEARCHER'S ESTIMATE BASED ON HOUSEHOLD ITEMS CRITERIA.

Rich ... Well Off ... Comfortable ... Poor ... Very Poor ...

18. Do you think your answers are a fair reflection of opinions on conservation in your neighbourhood?
YES ... NO ... [Please elaborate:]

19. In your opinion, does this survey cover the important issues which will affect the conservation of Wolfgat?
YES ... NO ... UNSURE ...

20. If NO or UNSURE, which other outstanding issues still need to be explored.
.....

21. Any other comments:

22. Are you aware of the invasive alien plant clearing programme in Wolfgat Nature Reserve?

YES NO

Explain your answer:

If YES, what do you think is the clearing program?.....

23. Are you aware of the invasive alien plant clearing programme of the government (Water Conservation, Kader Asmal). YES ... NO ...

If yes, name one reason for the programme:

THANK YOU

APPENDIX 5. User survey questionnaire.

ATTITUDES OF USERS TO THE CONSERVATION AND UTILISATION OF WOLFGAT NATURE RESERVE

This research is being undertaken as part of a Doctor of Philosophy degree through the
Institute for Plant Conservation
Department of Botany
at the
University of Cape Town

The questionnaire explores some of the options for usage and development, factors that affect and could improve usage, and knowledge of users of the Wolfgat Nature Reserve.

Pilot testing has indicated that it will take approximately
45 minutes to complete the questionnaire.

Respondents in many attitudinal surveys feel that they have to give answers to please the interviewer and say what the interviewer would like to hear. This weakens the effectiveness of the survey if respondents do not express their genuine feelings.

The academic credibility of this research thus depends on
your honest answers.

Name:

User Category: 1. Fisherman ... 2. Teacher ... 3. Pupil ...

School Name: Secondary Primary

Date:

Time taken: to

THANK YOU

THEO MANUEL

PART A - GENERAL

SECTION A: USER PROFILE

A1. Where do you live?

A2. How old are you? years.

A3. Gender: Male ... Female ...

A4. Home Language: English ... Afrikaans ... Bilingual ... Xhosa ... Other (please specify):
.....

A5. Occupation:

If teacher: std/s you teach:
 subjects you teach:

A6. Education: --- /< std.2 ... std.3-4 ... std. 5-7 ... std. 8-9 ...
std. 10 ... Diploma (std. 10+3) ... Degree(3 years) ... Degree(4 years) ... Honours ... Masters ...
 Doctorate ...

SECTION B: UTILISATION

B1. Please state your reason/s for using/visiting Wolfgat.
You may tick more than one answer.

Angling
Birdwatching
Environmental Education
Picknicking
Relaxation
Watching the scenery
Swimming
Walking/Exercise
Other (please specify)

B2. How often have you visited Wolfgat?

A) Often (more often than twice/month) ...
B) Regular (once/month) ...
C) Occasionally (once every 3 months) ...
D) Infrequently (once or twice a year) ...
E) Once only ...
F) Never ... IF NEVER, GO TO B5

B3. For how long have you been coming to Wolfgat?
.....

B4. What do you enjoy when visiting Wolfgat?
.....

B5. What makes Wolfgat important to you?

[In other words, what value do you see in Wolfgat]

Choose at least 8 options - you may use the numbers only. Rank them from most to least important.

POSSIBLE OPTIONS

Part of our history Birds Lots of plants Place for wild animals' Insects Buffer zone
between sea and houses It's our only nature reserve Heritage for future generations For Scrambling
... .. For bicycle riding For Education For Recreation(Walking/Relaxation) Pick plants Pick
Herbs Firewood Jobs Tourism

Other (please elaborate):
.....

B6. What facilities should be provided to make your visit more enjoyable? Use the numbers only. Rank them from most to least important.

.....

OPTIONS

Relates to: 1.Environmental/Info. Centre ... 2.Bird Hide ...3.Information boards ... 4.Parking area ... 5.Paths/trails ... 6.Picnic/Braai areas ... 7.Toilets ... 8.Taps ...

9. Other:

B7. What drawbacks outside the reserve makes it difficult for you to visit Wolfgat? Rank your options - use the numbers.

.....

OPTIONS

Relates to: 1.Lack of information ... 2.No transport ... 3.Not relevant in school syllabi ... 4. Poor access from roads ... 5.Significant others ... 6.Other (specify)

B8. What factors inside the reserve should be improved to make your visit enjoyable? Rank your options - use the numbers.

.....

OPTIONS

Relates to: 1.Safety ... 2.No paths/Trails ... 3.No patrols. ... 4.No lights ... 5.No guides ... 6.Thick bush ...

7. Pollution ... 8. Other

B9. Other than your use, what other uses should Wolfgat be put to?

.....

POSSIBLE OPTIONS

Coastal Resort ... Houses ... Soccer Field ... Burial Grounds ... Camp Site ... Other/s

None of these ...

Please explain your answer/s:.....

B10. Will you please circle whether you AGREE, DISAGREE, OR DON'T KNOW, with the following statement.

"Users should be fully consulted before any developments take place in Wolfgat".

Agree ... Disagree ... Don't Know

SECTION C: INTERPRETATION IN THE RESERVE

C1. What kind of information should be developed for when you visit Wolfgat? (Please rank in order of importance)

Booklet on plants and animals ...

Booklet on medicinal plants ...

General information pamphlet ...

Book on trails in Wolfgat ...

Education opportunities ...

Other (please specify):

2. What kind of information should your 3 most important choices contain?

Choice 1.....

Choice 2.....

Choice 3.

C3. How should this information be presented? (Please only select your choice).

Detailed facts with pictures ...

Mostly pictures with few relevant facts ...

In a story with pictures ...

Other (please specify):

C4. What type of visitation programme should be developed to make your visit enjoyable? (Please rank in order of importance 1 to 7).

OPTIONS

Information talks on aspects of the area ...

Self-guided tours ...

Guided tours paid for by CCC ...

Guided tours paid for by myself ...

Visits to ecologically significant areas ...

Identification of relevant areas for discovery learning ...

Environmental education activity sheets ...

Other (please specify):

SECTION D: COMPARISON OF LAND-USE OPTIONS

D1. If you compare Wolfgat Nature Reserve to other forms of land-use, what could the reserve best be used for? Please rank in order of importance 1 to 8, where 1=best usage option, 2=next best option and 8=not a good option).

OPTIONS

Housing development ...

Playpark ...

Kept as a nature reserve only for plants and animals ...

A nature reserve with many other uses (eg. leisure area) ...

Eco-tourism ...

Caravan Park ...

Camp site ...

Other (please specify)

D2. Will you please tell me whether you AGREE, DISAGREE, OR DON'T KNOW with these statements.

"If land was scarce, Wolfgat should be used to build houses"

Agree ... Disagree ... Don't Know ...

Please explain your answer:

SECTION E: KNOWLEDGE OF CONSERVATION AND THE AREA

E1. What do you understand by the term conservation?

.....

E2. What kinds of plants occur in Wolfgat?

.....

E3. What kinds of animals occur in Wolfgat?

.....

E4. What do you think are the main threats to Wolfgat?

(Please rank in order of importance 1 to 7, where 1=greatest threat and 7 the least threat).

Thick bush (alien trees) ...

Increasing housing development (urbanisation) ...

Rubbish dumping ...

Fires ...

Pollution of sea ...

Unsafe (crime) ...

Lack of information ...

Pollution of land ...

Other (please specify):

E5. Any other comments?

.....

SECTION F: PARTICIPATION IN WOLFGAT PROJECT 1995 - 1996

F1. Have you participated in any of the workshops/ excursions during the project in 1995-1996?

YES .. NO ...

F2. What activities did you partake in?

F3. Give examples of how you enjoyed the project. Reasons?

.....

F4. How could the project have been improved if it was conducted again?

.....

F5. Have you been part of taking a group of pupils to Wolfgat? YES ... NO ...

F6. If yes, what was the reason for your visit?

PART B: USER SPECIFIC SECTION

FISHERFOLK

SECTION A: UTILISATION

A1. What type of fish do you catch at Wolfgat?

.....

A2. How much fish do you catch on average per visit?

A3. In which season do you fish the most? Please circle which months.

Jan Feb Mar Apr May June July Aug Sep Oct Nov Dec

Relates to: Spring ... Summer ... Autumn ... Winter ...

A4. Where do you obtain your bait?

SECTION B: GENERAL VIEWS

B1. Will you please tell me whether you STRONGLY AGREE, AGREE, DISAGREE, STRONGLY DISAGREE, OR DON'T KNOW, with these statements.

Fishermen need a permit to catch fish at Wolfgat

SA A D SD DN

Only fish large enough should be caught, smaller fish should be thrown back to grow to its full size

SA A D SD DN

Only a certain number should be caught so that enough remains to build up numbers again

SA A D SD DN

If we catch a certain number, there will always be enough in the future

SA A D SD DN

A permit will help the number of fish being caught

SA A D SD DN

Fishermen must be allowed to fish without restrictions

SA A D SD DN

Fishermen need to be fully consulted about upgrading Wolfgat

SA A D SD DN

THANK YOU FOR YOUR PARTICIPATION IN THIS SURVEY

TEACHERS

SECTION A: TEACHING AND TEACHING AIDS

A1. What subjects do you teach in Wolfgat at present, if any?

.....

A2. What subjects could be taught in Wolfgat?

.....
.....

A3. What type of teaching aids should be developed to make your lessons in Wolfgat successful.

.....

A4. How should these teaching aids be developed?

a) By someone with specialist knowledge: ...

b) Teachers' themselves ...

c) Teachers together with specialists ...

d) Other (please specify)

A5. What are the main drawbacks, if any, which would keep you from visiting Wolfgat?

NONE:

SOME, ... PLEASE ELABORATE:

.....

SECTION B: LOGISTICS OF VISITING WOLFGAT

B1. How many pupils on average, would you take when visiting Wolfgat?

B2. Considering the answer in B1, how much person-support would you need for your trip.

.....

B3 a) Do you consider a resource centre relating to Wolfgat important? YES NO

Why do you say so?

.....

B3 b) If yes, what kind of resources should it house?

.....

B4. Any other comments?

.....

.....

.....

THANK YOU FOR YOUR PARTICIPATION IN THIS SURVEY

PUPILS

SECTION A: ACTIVITIES RELATING TO SCHOOL

A1. What subjects would you like to be taught in Wolfgat Nature Reserve? Indicate the most to least important to you.

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....

A2. What projects would you like to be set on Wolfgat?

.....
.....

A3. If yes to A2, what help would you need to complete the projects?

Information in libraries

Book on information in Wolfgat

Person to take us there

Other (please specify):

SECTION B: ACTIVITIES NOT RELATED TO SCHOOL

B1. What activities, other than school, would you do in Wolfgat Nature Reserve?

.....
.....

B2. What can be done in the reserve to make these activities enjoyable?

.....
.....

B3. Why is an area like Wolfgat important for our community?

.....
.....
.....

THANK YOU FOR TAKING PART IN THIS SURVEY

APPENDIX 6. Protocol of questions that were used for the individual interviews held in March 1996, and then again to gather responses from teachers, to using WNR in their practice in a period of change, i.e. in the context of implementation of OBE, during August 2001 to May 2002

FOR THE INDIVIDUAL INTERVIEWS HELD IN MARCH 1996.

1. Use of WNR:

1.1 Why do you think you used WNR? Which sites in WNR did you use and what threats did you identify at these sites. What were the drawbacks you thought would keep you from using WNR? What would need to be addressed in order for you to use WNR? In which learning areas would you continue using WNR?

1.2 What were the challenges you found when using WNR? Explain the nature of the challenges. What were the key factors which allowed you to use WNR, irrespective of the challenges?

2. Teacher development

2.1. Describe how you felt personally before, during and after the workshops

2.2. Describe the changes in your teaching practice after involvement in the WNR workshops?

2.3. How did using WNR impact on your teaching and learning at school?

2.4. Describe how the programme affected the manner in which you worked with teachers in the workshops and out of the workshops

2.5. What were the main skills you needed to use WNR? How do you suggest teachers obtain these skills in the future?

5. Implementation and the support challenges.

5.1. What makes it possible to use WNR in your practice? Explain.

5.2. What makes it difficult to use WNR in your practice? Explain.

support do you need to use WNR, at your school and in the reserve, now and in the future?

3. Curriculum development and integration:

3.1 How can WNR be used in curriculum development?

3.1. How can investigations done be accommodated in your school programme

4. Resource development

4.1 How did your approach to using resources change when using WNR?

For teacher responses to using WNR in a period of change: implementing OBE

1. Describe how you used WNR when implementing OBE

2. How easy was it to develop learning programmes when you had to implement OBE?

3. What factors made it difficult to implement WNR in an OBE context?

4. Are there any other comments you would like to make?

APPENDIX 7. Protocol of questions that were used for the focus group interviews held in March 1996.

1. Teacher development:

- 1.1 Describe how being involved with the WNR programme assisted you in your professional work
- 1.2 Describe how you felt personally before, during and after the workshops
- 1.3 Describe how the programme affected the manner in which you worked with teachers in the workshops, and out of the workshops

2. Use of WNR:

- 2.1 Why do you think you used WNR? Which sites in WNR did you use and what threats did you identify at these sites. What were the drawbacks you thought would keep you from using WNR? What would need to be addressed in order for you to use WNR? In which learning areas would you continue using WNR?
- 2.2 What were the challenges you found when using WNR? Explain the nature of the challenges. What were the key factors which allowed you to use WNR, irrespective of the challenges?

3. Curriculum development and integration:

- 3.1 Did you use any of the activities / units we developed in the workshops in your teaching since the end of the workshops last year? Describe how you went about doing this. How do you think did this affect your teaching? Was your impression that the pupils found this relevant?
- 3.2 Did some of the other teachers in other phases also get involved in teaching about WNR? If yes, how did they go about doing this? Do you think that it worked? Explain.

4. Resource development for lowland fynbos environments such as WNR

- 4.1 What resources did you use when teaching about the environment, in WNR?
- 4.2 Was the resources easily accessible, easy to prepare for your classroom, easy to use?
- 4.3 Did you use any of the resources we identified and developed in the workshops. What do you think was the reasons for your answer?
- 4.4 How would you say the materials development and reproduction should be taken further?

5. Implementation and the support challenges associated with the implementation process:

- 5.1. What support do you need to use WNR, at you school and in the reserve, now and in the future?
- 5.2 What do you think made it easy or challenging to implement WNR activities in your practice?

6. Lack of a structured usage programme for education in WNR:

- 6.1 What recommendations do you have for such a programme

7. Inset and curriculum policies at local district level

- 7.1 Would you participate in the WNR project in the future?
- 7.2 What suggestions do you have for future local teacher environmental education inset programmes and policies.

APPENDIX 8: Answers to Qualitative Questions posed to further clarify answers in Section B of the Questionnaire.

Appendix 8, Box 1. The questions in the box below refers to utilization of the reserve under two management scenarios: Wolfgat remains as it is versus Wolfgat upgraded. Values are expressed as a percentage and rounded up.

Question and responses	Residents (n=200)	Community Leaders (n=100)
Why would you want to use the reserve as it stands at the moment? * Unattractive due to no facilities such as toilets and taps * Bushiness of invasive alien plants makes it unsafe and dangerous * To enjoy nature * For educational outings including for the local schools * Walking, Hiking, Relaxation * No response	14 1 7 2 7 69	14 5 7 2 13 59
How can the drawbacks, that will keep you from using the reserve, be solved? * Employ patrols to monitor crime and dumping * Thin and remove invading alien plants via job creation programme * Conduct an education and awareness campaign in local community * Impose stiff fines for dumping * For m an institutional structure e.g. steering committee for the area * Upgrade the area with facilities * No response	46 27 15 6 4 2 0	41 13 17 20 4 3 2
What facilities must be developed to encourage your usage of the area? * An information centre with toilet facilities, curio shop and museum * Recreation and picnic area * Golf course * Fishing area * Observation tower * Plant nursery * Hiking trails * Disability entrance	73 18 1 1 1 1 4 1	72 28 0 0 0 0 0 0
How could these facilities benefit the community * Employment * Recreation * Family outings * Environmental Education for local schools * Place to relax * Income derived there could be used for community projects * Place to get close to and appreciate nature * Camping * Save on finances, do not have to go far to enjoy nature * Foster community pride as a heritage for future generations * To build much needed housing there	36 15 12 20 9 2 2 1 1 1 1	28 41 6 9 4 2 2 1 0 7 0

Appendix 8, Box 2. The rank order of importance of seven factors which Residents ($n=200$) and Community leaders ($n=100$) would like to see checked (monitored) to encourage their ongoing usage. Values are expressed as a percentage and rounded up. Significant differences between factors within Residents and Community Leaders are calculated using the Wilcoxon-matched pairs test and in each case are compared with the most important factor that must be checked i.e. "Crime". NS= not significant.

Factors	Residents ($n = 200$)								Community Leaders ($n = 100$)							
	1st	2nd	3rd	4th	5th	6th	7th	<i>P</i>	1st	2nd	3rd	4th	5th	6th	7th	<i>P</i>
Ongoing information	13	13	18	18	17	13	10	NS	26	22	13	8	9	16	6	NS
Guides	11	11	15	14	16	18	18	NS	10	14	12	18	9	14	23	NS
Regular patrols	29	22	15	18	9	5	4	NS	30	17	22	18	5	3	5	NS
Crime	30	15	14	11	11	7	14	--	15	16	18	15	13	9	14	--
Pollution	7	12	13	10	18	27	14	NS	9	9	13	17	21	22	9	NS
Dumping of rubbish	9	20	12	12	14	16	19	NS	3	12	10	14	18	22	21	NS
Ability to walk easily	2	9	15	19	17	15	24	NS	7	10	12	10	25	14	22	NS

APPENDIX 9: Reactions of residents and community leaders to the question, "Please rank in order of preference the following 13 options, ranking only the eight greatest priorities for allocating R1 million for community development".. Numbers 1 to 8 represent their first- to last- choice options. Probability value is relative to Wolfgat conservation in each group. Probability value calculated only on respondents that did respond. NSup = indicates the number of respondents who did not support that particular use. Values are expressed as a percentage and rounded up.

Development option	Rank of community development option								NSup	P
	1st	2nd	3rd	4th	5th	6th	7th	8th		
Residents (n = 200)										
Housing	22	12	16	12	8	6	7	6	14	0.77
Education	16	16	13	12	11	9	12	7	6	0.31
Wolfgat Conservation	9	7	7	9	8	11	12	17	22	---
Crime	13	9	7	8	13	17	9	9	16	0.61
Job creation	20	21	16	16	9	9	4	3	5	0.56
Transport	1	2	4	4	4	7	7	15	59	0.01
Health& Welfare	11	16	18	15	13	8	7	3	11	0.53
Food for the needy	4	7	8	13	12	8	11	10	29	0.52
Building material	1	3	5	3	4	3	7	7	69	0.01
Religious buildings	5	5	4	5	9	10	6	7	52	0.02
Burial grounds	2	3	1	2	5	4	6	7	72	0.01
Small business development	0	2	2	2	6	7	9	7	67	0.01
Ecotourism	1	0	2	2	2	4	5	5	81	0.01
Community leaders (n = 100)										
	1st	2nd	3rd	4th	5th	6th	7th	8th	NSup	P
Housing	17	19	15	7	8	7	6	11	10	0.79
Education	15	12	13	23	16	2	5	3	11	0.31
Wolfgat Conservation	7	7	10	10	10	17	16	9	14	---
Crime	8	5	12	14	13	14	11	10	23	0.79
Job creation	34	23	19	9	3	3	3	1	5	0.61
Transport	2	2	2	3	8	9	10	10	54	0.04
Health& Welfare	14	12	19	12	14	14	6	4	5	0.86
Food for the needy	1	8	3	4	9	11	13	10	41	0.01
Building material	0	2	0	1	1	3	2	2	89	0
Religious buildings	0	0	0	3	2	2	1	5	87	0
Burial grounds	2	1	0	2	3	4	6	10	72	0
Small business development	0	8	6	9	8	8	13	11	37	0
Ecotourism	0	1	1	3	5	6	8	14	62	0

APPENDIX 10: Answers to Qualitative Questions posed to further clarify answers in Section D of the Questionnaire : It refers to attitudes toward the conservation of Wolfgat in relation to the socio-economic development themes of the surrounding Mitchells Plain community. Values are expressed as a percentage and rounded up.

Question and responses	Residents (n=200)	Community Leaders (n=100)
Why did you select the options (community priorities) in this particular sequence?		
* Unemployment high and Job Creation will solve other needs	12	30
* We must reduce the crime rate which is very high	13	2
* Providing scarce housing will provide stability and upgrade the quality of life. Construction of houses will also provide jobs	22	36
* Education provides a basis for a good future	16	15
* Wolfgat needs to be upgraded so that it can be used for education and tourism	5	4
* Need more religious buildings such as churches and mosques	3	0
* No responses	29	13
How could Wolfgat help in addressing this (the priorities chosen)?		
* Employment when facilities are upgraded, removing the invading alien plants and maintaining the area	52	35
* Environmental education to be used as an outdoor classroom to do curriculum-based activities	29	32
* Harvesting of herbs for cheaper medicines	5	13
* An area for the youth to go and so reduce crime	5	2
* An area for eco-tourism and so create employment	1	6
* An area for mental relaxation, physical fitness and nature appreciation	5	7
* Educate community with life skills there	0	2
* Fresh air	1	1
* Use area as a burial site	1	1
* Religious inspiration by bringing you closer to God	1	1

APPENDIX 11: Answers questions posed Section E of the questionnaire which refers to co-operation and communication which could influence the future of Wolfgat. Values are expressed as a percentage and rounded up.

Appendix 11a. Responses to the question "What does City Council (officials) do in Wolfgat? Do you think they...?" Totals provided in percentages. P value calculated via χ^2 tests - only on those who could take a position of Yes or No.

Do they	RESIDENTS			P	COMMUNITY LEADERS		
	Yes	No	Don't Know		Yes	No	Don't Know
a) Keep the area clean?	12	18	70	0.48	41	42	17
b) Protect citizens from criminals?	4	22	74	0.04	6	83	11
c) Protect plants and animals?	9	12	79	0.11	52	38	10
d) Prevent hunting in the area?	4	10	86	0.61	31	58	11
e) Attract tourists to the area?	6	15	78	0.00	6	65	29
f) Keep people from using the area?	2	5	93	0.82	17	54	29

Appendix 11b. Responses to the question "What does City Council (officials) do in Wolfgat? How well do they do it...?" Totals provided in percentages. The χ^2 probability values relates to inter-group comparisons namely Very well/Well versus Not well (Fairly/Poorly/Very Poorly).

How well do they	RESIDENTS						COMMUNITY LEADERS					
	VW	W	F	P	VP	P	VW	W	F	P	VP	P
a) Keep the area clean?	3	3	8	67	19	0.00	0	18	20	47	15	
b) Protect citizens from criminals?	1	3	4	79	13	0.69	0	5	0	53	42	
c) Protect plants and animals?	1	2	15	76	6	0.00	7	5	15	62	11	
d) Prevent hunting in the area?	1	1	3	92	3	0.00	5	15	5	22	53	
e) Attract tourists to the area?	2	4	3	84	7	0.61	5	0	0	47	48	
f) Keep people from using the area?	1	95	1	2	1	0.00	16	14	0	52	18	

Appendix 11c. Responses to the question "What does City Council (officials) do in Wolfgat? How important is it...?" Totals provided in percentages. Except for the last question, Significance level not calculated as the overwhelming majority in both groups felt that this was important. (Legends: VI= very important; I= important; DN = don't know; NI= not important; INS = insignificant).

How important is it that they	TAFELSIG						HARARE					
	VI	I	DN	NI	INS	P	VI	I	DN	NI	INS	P
a) Keep the area clean?	64	36	1	0	0		88	12	0	0	0	
b) Protect citizens from criminals?	62	38	0	0	0		76	17	0	7	0	
c) Protect plants and animals?	61	39	0	0	0		89	11	0	0	0	
d) Prevent hunting in the area?	60	39	1	1	0		79	16	0	5	0	
e) Attract tourists to the area?	58	40	1	1	0		81	19	0	0	0	
f) Keep people from using the area?	1	1	0	96	2	0.00	32	6	0	44	18	

APPENDIX 12: Answers questions posed Section E of the questionnaire which refers to co-operation and communication which could influence the future of Wolfgat.

Appendix 12a. Responses to the question, *How would you like to read/listen to, matters relating to Wolfgat?*. Values expressed as a percentage and rounded up. Definitely/Yes collapsed into Yes, while Not really/Not-at-all collapsed into Not Really. P-value calculated using chi-squared test on Definitely/Yes versus Possibly/Not really/Not at all This done to test for differences in preference to each information transfer mechanism between residents and community leaders.

Information transfer mechanism	Residents (n=200)			Community Leaders (n=100)			P between
	Yes	Poss.	NR	Yes	Poss.	NR	
Signboards	75	3	22	88	6	6	0.01
Radio	87	3	10	90	5	5	0.45
Pamphlets	69	3	28	72	11	17	0.59
Community meetings	96	2	2	100	0	0	0.04
Television	91	1	8	32	0	68	0.00

Appendix 12b. Answers to Qualitative Questions posed to further clarify answers in Section E of the Questionnaire which refers to co-operation and communication which could influence the future of Wolfgat. Values are expressed as a percentage and rounded up.

Question and responses	Residents (n=200)	Community Leaders (n=100)
If you had to go to one of these (education) programmes, what would make it worthwhile?		
* To explain the attributes of Wolfgat	31	45
* Show us what plants and animals are found there	14	5
* Show us what facilities/developments are being planned there	23	13
* How we can protect the animals	7	2
* How safe it is	2	0
* Empower us to conduct workshops on Wolfgat elsewhere	0	17
* How much it will benefit us in education	5	7
* Tell us how we can grow indigenous/medicinal plants found in WNR	0	5
	2	0
* Opening and closing times	6	0
* How it can benefit me	10	6
* No response		
How can you help with Wolfgat conservation?		
Available Responses		
* Raise awareness in community and in meetings I attend	31	65
* Help with security e.g. voluntary patrols	28	5
* Involve elderly and youth in nature-based programmes	7	14
* Involvement in the administration and committees	5	16
* Don't have any time	22	0
* Not interested	7	0

APPENDIX 13: Answers to Qualitative Questions posed to further clarify answers in Section B of the Questionnaire : All values are expressed as a percentage.

Appendix 13a. The questions in the box below refers to utilization of the reserve under two management scenarios: Wolfgat remains as it is versus Wolfgat upgraded. Percentages given.

Question and responses	Tafelsig (n=31)	Harare (n=30)
How can the drawbacks, that will keep you from using the reserve, be solved?-		
* Employ patrols to monitor crime and dumping	37	37
* Thin and remove invading alien plants via job creation programme	13	25
	13	7
* Conduct an education and awareness campaign in local community	13	14
	9	6
* Impose stiff fines for dumping	6	4
* For m an institutional structure e.g. steering committee for the area	3	7
	3	0
* Upgrade the area with facilities	3	0
* Local authority to clean up regularly		
* Improve lighting at night		
* Crime cannot be solved		
What facilities must be developed to encourage your usage of the area?		
* An information centre with toilet facilities, curio shop and museum	58	67
	13	26
* Recreation and picnic area	0	0
* Golf course	6	0
* Fishing area	0	0
* Observation tower	0	7
* Plant nursery	23	0
* Hiking trails	0	0
* Disability entrance		
How could these facilities benefit the community		
* Employment	0	53
* Recreation	3	27
* Family outings	3	0
* Environmental Education for local schools	52	4
* Place to relax	0	0
* Income derived there could be used for community projects	3	0
* Place to get close to and appreciate nature	23	0
*Camping	0	0
* Save on finances, do not have to go far to enjoy nature	3	0
* Foster community pride as a heritage for future generations	13	16
* To build much needed housing there	0	0

APPENDIX 14: Answers to questions posed in Section E of the questionnaire which refers to co-operation and communication which could influence Wolfgat's future. Values expressed as percentages.

Appendix 14a. Responses to the question "What does City Council (officials) do in Wolfgat? Do you think they ...? Totals provided in percentages. Note that none of the Harare respondents answered this question as they felt they did not know enough about the area

Do they	TAFELSIG (n = 31)				HARARE (n = 30)		
	Yes	No	Don't Know		Yes	No	Don't Know
a) Keep the area clean?	32	32	36		0	0	0
b) Protect citizens from criminals?	10	48	42		0	0	0
c) Protect plants and animals?	19	23	58		0	0	0
d) Prevent hunting in the area?	16	23	61		0	0	0
e) Attract tourists to the area?	10	32	58		0	0	0
f) Keep people from using the area?	13	32	55		0	0	0

Appendix 14b. Responses to the question "What does City Council (officials) do in Wolfgat? How well do they do it ...? Totals provided in percentages. Note the non-response of Harare respondents was the same as for above table.

How well do they	TAFELSIG (n = 31)				
	Very Well	Well	Fair	Poor	Very Poor
a) Keep the area clean?	6	9	13	6	66
b) Protect citizens from criminals?	3	3	3	23	68
c) Protect plants and animals?	3	3	0	19	75
d) Prevent hunting in the area?	9	0	3	6	82
e) Attract tourists to the area?	3	9	0	9	79
f) Keep people from using the area?	9	6	3	9	73

Appendix 14c. Responses to the question "What does City Council (officials) do in Wolfgat? How important is it ...? Totals provided in percentages. Except for the last question, Significance level not calculated as the overwhelming majority in both groups felt that this was important. Significance value calculated using χ^2 test on (VI= very important; I= important) versus (DN = don't know; NI= not important; INS = insignificant). NS= not significant, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

How important is it that they	TAFELSIG (n = 31)					P	HARARE (n = 30)				
	VI	I	DN	NI	INS		VI	I	DN	NI	INS
a) Keep the area clean?	63	36	1	0	0	NS	88	12	0	0	0
b) Protect citizens from criminals?	62	38	0	0	0	NS	76	17	0	7	0
c) Protect plants and animals?	61	39	0	0	0	NS	89	11	0	0	0
d) Prevent hunting in the area?	59	39	1	1	0	NS	79	16	0	5	0
e) Attract tourists to the area?	58	40	1	1	0	NS	81	19	0	0	0
f) Keep people from using the area?	1	1	0	96	2	**	32	6	0	62	0

APPENDIX 16: Answers relating to usage patterns of four user groups. Answers related specifically to factors which influence the visitation of the four user groups to WNR.

Appendix 16a. The rank order of factors which influence the visitation of four user groups to the WNR. Reasons are provided by the two adult user groups (Fisherfolk and teachers), for visiting WNR. Values are expressed as a percentage and rounded up. Significant differences between factors within each group have been calculated using the Wilcoxon-matched pairs test, and in each case compared to the most important drawback. For facilities to be provided, i.e. "Enviro/ Information centre". For drawbacks outside WNR which makes it difficult to visit, i.e. "the lack of information". For drawbacks inside WNR which should be improved, i.e. "safety". NS= not significant, * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Factor which influences visitation	User Group																	Over-all %
	Fisherfolk (n=50)				Teachers (n=40)				Secondary pupils (n=50)				Primary pupils (n=100)					
	1st	2nd	3rd	P	1st	2nd	3rd	P	1st	2nd	3rd	P	1st	2nd	3rd	P		
Facilities to be provided																		
Enviro/ Information centre	14	2	0	—	75	3	5	—	94	0	0	—	40	0	0	—	18	
Birdhide	2	10	0	*	0	18	3	NS	2	6	0	**	13	4	0	**	5	
Information boards	16	6	16	*	5	45	28	NS	0	50	16	NS	15	18	5	NS	17	
Parking	54	18	0	***	5	8	10	NS	4	14	4	NS	2	6	0	**	9	
Paths/Trails	0	10	8	NS	3	13	25	NS	0	22	24	NS	14	17	6	NS	12	
Picnic/ Braai areas	6	38	2	NS	0	0	13	NS	0	4	4		12	12	5	NS	8	
Toilets	6	16	58	*	5	5	10	NS	0	4	32	**	4	38	26	NS	19	
Taps	0	0	16	*	3	3	0	*	0	0	20	**	0	5	58	**	11	
Other (jetty- for fisherfolk; guides – teachers)	2	0	0	***	5	8	8	NS	0	0	0	***	0	0	0	** *	1	
TOTAL																		100
Drawbacks outside WNR which makes it difficult to visit																		
1. Lack of info.	20	2	0	---	75	5	13	---	86	6	2	---	53	5	14	---	23	
2. No transport	2	18	0	**	3	38	8	NS	6	46	8	NS	26	44	5	NS	19	
3. Not relevant in school curriculum	0	0	0	**	3	25	15	NS	6	40	34	NS	5	17	6	NS	12	
4. Poor access from roads	0	2	20	**	18	30	35	NS	2	6	22	*	6	25	28	NS	16	
5. Significant others	0	0	2	NS	0	0	28	*	0	2	34	NS	10	9	47	NS	13	
6. None	78	78	78	**	3	3	3	**	0	0	0	***	0	0	0	** *	17	
TOTAL																		100
Drawbacks inside WNR which should be improved to make visit enjoyable																		
1. Safety	92	2	0	--	75	5	5	---	24	4	10	---	19	4	20	---	20	
2. No paths/trails	0	14	0	**	8	30	3	NS	8	8	2	NS	2	13	41	NS	12	
3. No patrols	6	64	0	**	5	20	25	NS	4	18	8	NS	0	6	8	NS	12	
4. No lights	0	12	46	NS	0	8	8	NS	0	2	0	**	1	11	6	NS	8	
5. No guides	0	2	8	*	13	10	20	NS	26	20	18	NS	3	12	2	NS	10	
6. Thick bush	0	6	40	*	0	28	10	*	18	20	32	NS	9	38	14	NS	19	
7. Pollution	2	0	6	*	0	0	30	**	16	28	30	NS	66	16	9	*	14	
TOTAL																		100

APPENDIX 17: Answers relating to preference of consumptive versus non-consumptive land-use practices in the WNR.

Appendix 17a. Results of χ^2 tests of for socio-economic factors of users that influenced preference of consumptive versus non-consumptive land-use practices in the WNR. M= mean number of years, C= consumptive and N = non-consumptive. NS= not significant, * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Socio-economic factor	User groups															
	Fisherfolk (n=50)				Teachers (n=40)				Secondary school pupils (n=50)				Primary school pupils (n=100)			
Age (years)	M	C	N	χ^2	M	C	N	χ^2	M	C	N	χ^2	M	C	N	χ^2
	<38	13	12	0.3	<35	8	13	0.2	<15	15	2	0.1	<13	43	6	0.5
	>38	15	10	NS	>35	6	13	NS	>15	30	3	NS	>13	47	4	NS
Education (grades=Gr)	Gr	C	N	χ^2	Gr	C	N	χ^2	Gr	C	N	χ^2	Gr	C	N	χ^2
	<12	19	18	0.4	12+3	9	18	0.1	10	28	2	0.2	6	67	5	2.7
	>12	8	5	NS	12+4	5	8	NS	11	18	2	NS	7	23	5	NS
Visitation length (years)	M	C	N	χ^2	M	C	N	χ^2	M	C	N	χ^2	M	C	N	χ^2
	<10	15	12	0.00	<2	6	14	0.4	<1	41	3	0.7	<1	63	5	1.7
	>10	13	10	NS	>2	8	12	NS	>1	5	1	NS	>1	27	5	NS
Residency (in/out of Mitchells Plain)	In or Out ?	C	N	χ^2	In or Out?	C	N	χ^2	In or Out ?	C	N	χ^2	In or Out ?	C	N	χ^2
	In	21	10	4.6	In	5	15	1.8	In	28	2	0.2	<1 km	60	0	11.2
	Out	7	12	*	Out	9	11	NS	Out	18	2	NS	>1 km	33	7	**
Gender (=G) (male or female)	G	C	N	χ^2	G	C	N	χ^2	G	C	N	χ^2	G	C	N	χ^2
	m	23	27	--	m	5	11	0.2	m	24	1	1.1	m	46	7	4.2
	f	0	0		f	9	15	NS	f	22	3	NS	f	46	1	*

APPENDIX 18: Answers relating to perceptions of four user groups. Answers related specifically to factors which influence the perceptions of four user groups to factors which threaten the conservation of the area.

Appendix 18a. Results of χ^2 tests of significance of relationships between socio-economic variables and perceptions of the three greatest factors (Thick bush, rubbish dumping and crime) which threaten the conservation of the area, formed by summarizing outcomes of χ^2 tests for each threat. Significance shown as, * $p < 0.05$, ** $p < 0.01$.

Threats per user group	Socio-economic factor				
	Mean age (years)	Education (Grade)	Mean visitation length (years)	Residency (relates to living in or out of Mitchells Plain)	Gender
For Fisherfolk	<38 versus >38	<Gr 12 versus >Gr 12	<10 versus >10 years	On versus Out	Male versus Female
Thick bushes	NS	NS	NS	11.8 **	NS
Rubbish dumping	NS	NS	NS	NS	NS
Crime	NS	NS	NS	NS	NS
For Teachers	<35 versus >35	<Gr12+3 versus >Gr12+4	< 2 versus >2 years	In versus Out	Male versus Female
Thick bushes	3.9 *	5.8 *	NS	NS	NS
Rubbish dumping	NS	NS	NS	NS	NS
Crime	NS	NS	NS	NS	8.0 **
For Secondary pupils	<15 versus >15 years	<Gr 10 versus >Gr 11	<1 versus >1 year	In versus Out	Male versus female
Thick bushes	5.3 *	NS	NS	NS	NS
Rubbish dumping	5.3 *	NS	NS	NS	NS
Crime	NS	3.8 *	NS	NS	NS
For Primary pupils	< 13 versus >13 years	<Gr 6 versus >Gr7	<1 versus > 1 year	<1km versus > 1 km from WNR	Male versus female
Thick bushes	NS	NS	NS	NS	NS
Rubbish dumping	NS	NS	NS	6.0 *	NS
Crime	NS	NS	NS	NS	NS

APPENDIX 19. Introduction worksheet developed by teachers for use in WNR.

INTRODUCTION WORKSHEET (SAMPLE)

Aim: An introduction to the nature reserve

Method: Answer the following questions only after you have completed the walk with the guide.

1. How did the Wolfgat Nature Reserve get its name?

2. Where is the Wolfgat Nature Reserve situated?

3. Why is the Wolfgat Nature Reserve so unique?

4. The reserve is characterized by two main vegetation types. Name them.

5. The invasion of alien vegetation seriously affects the existence of the indigenous vegetation. Name the two main types of alien vegetation.

6. Why was rooikrans planted in the area?

7. Name at least one mammal and one bird species you encounter in this reserve.

8. a) What role do plants play in the reserve? _____
b) What role do animals play in the reserve? _____
9. Do you think that the reserve has recreational potential?
If yes, name the two types that can be exercised _____
If no, suggest two possibilities. _____
10. Mention two realistic solutions how schools and the surrounding community can help with the conservation of the reserve.

11. The conservation of the reserve has been severely neglected. Mention the first thing that you would do to start the conservation process.

APPENDIX 15. Usage patters of four user groups. Answers related to “why they visit WNR” and ‘why they enjoy visiting WNR”.

Appendix 15a. The rank order of reasons provided by the Fisherfolk and Teacher user groups, for visiting WNR. Percentage values are shown. Significance levels within each group were calculated using the Wilcoxon-matched pairs test. Analysis within fisherfolk and teachers groups was carried out relative to “Fishing” and “Education”. Respectively. NS= not significant, * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Reason for visiting WNR	Fisherfolk (n=50)				Teachers (n=40)			
	1st	2 nd	3rd	P	1st	2 nd	3rd	P
1. Fishing	100	0	0	---	3	0	3	***
2. Education	0	0	0	***	83	3	3	---
3. Relaxation	0	66	34	NS	8	50	5	*
4. Scenery	0	26	60	NS	3	43	45	*
5. Exercise	0	0	6	**	0	3	45	*
6. Bird watching	0	8	0	**	5	3	0	*
TOTALS	100	100	100		100	100	100	

Appendix 15b. Percentage responses for why secondary (n=50) and primary school (n=100) pupils visit WNR.

Reason for visiting WNR	Secondary school pupils (n=50)		Primary school pupils (n=100)	
	N	%	N	%
1. Fishing	9	18	15	15
2. Birdwatching	12	24	57	57
3. Environmental Education	31	62	59	59
4. Picknicking	8	16	31	31
5. Relaxation	18	36	28	28
6. Scenery	28	52	52	52
7. Swimming	6	12	35	35
8. Exercise	13	26	44	44
9. Litter cleanups	0	0	2	2
10. Hiking	0	0	2	2

Appendix 15c. Responses of each user group to the question “What do you enjoy when visiting?” Percentages shown.

Activity type	User group			
	Fisherfolk (n=50)	Teachers (n=40)	Secondary school pupils (n=50)	Primary school pupils (n=100)
1. Fishing	40	4	0	0
2. Relaxation	26	0	4	14
3. Family outings	14	0	0	0
4. The clean air	8	0	0	5
5. Being close to nature	6	40	30	12
6. Enjoying the peace and quiet	4	3	2	0
7. The plants	0	23	16	40
8. The scenic views	2	15	16	0
9. Bird watching	0	10	0	4
10. Education activities	0	5	0	0
11. Watching the insects	0	3	10	6
12. Watching the animals	0	0	0	9
13. Walking	0	0	4	8
14. Picking up litter	0	0	18	2
TOTALS	100	100	100	100

APPENDIX 20. Pollution Learning Programme with litter data sheet developed by teachers for use in WNR.

Activities (what pupils will do)	Resources	Outcomes	Time (No. lessons)
Creating awareness: 1) Video on WNR 2) Understanding: What are the attributes of WNR (plants, animals, sites); What are threats – e.g. pollution. 3) Introduction to the pollution audit. Materials, Methods and tools	* ☼ √	NS 1,2,3	1 1 1
Field visit into WNR:- and litter count 1) Introduction activity 1) Pupils conduct the pollution audit in WNR 2) Pupils ensure that all black bags with litter is collected 3) Litter is counted and all litter data sheets completed	worksheet litter data sheet	NS 1,2	3 (in one 2 ¼ hour session in WNR)
Consolidate and report findings: 1) In the classroom: - finalize calculations and compile graphs 2) Presentation of audit findings to rest of class 3) Discussion of Human impact on the WNR environment and compile plan of action	Litter data sheets	M 3 SS (Geo) 3 SS (Geo) 3	2 1 2

Key to the resources:

- * = WNR video
- ☼ = Discovering WNR booklet
- √ = live material e.g. plastics, bottles, paper
- = pollution audit kit

Key to the outcomes:

- NS = Natural Sciences learning area
- M = Mathematics learning area
- SS (Geo) = Social Sciences learning area (Geography component)

LITTER DATA SHEET

Method: Use this data sheet to add all the different types of litter. Use this information as a basis to draw your pollution graph.

Bottles	Green	Brown	Clear	Total	Metal	Total
Drink					Cooldrink cans	
Food					Aerosol cans	
Other					Food tins	
Light bulbs					Foil	
Crockery					4 litre gallon drums	
Other pieces					Bottle caps	
					Wire	
					Other (specify)	

Wood	Ice cream sticks	Boat wreckage	Other (specify)	Total

Rubber	Tyres	Gum boots	Balloons	Gloves	Other (specify)	Total

Cloth/clothing	Clothing	Pieces of clothing	Shoes	Carpet	Other (specify)	Total

Polystyrene	Cups	Fast-food containers	Packaging	Meat trays	Total

Cardboard/ Paper	Paper bags	Cardboard boxes	Cups	News-papers	Magazines	Cigarette packets	Sweet rappers	Other (specify)	Total

Any other types of litter	Item (specify) : _____	Total

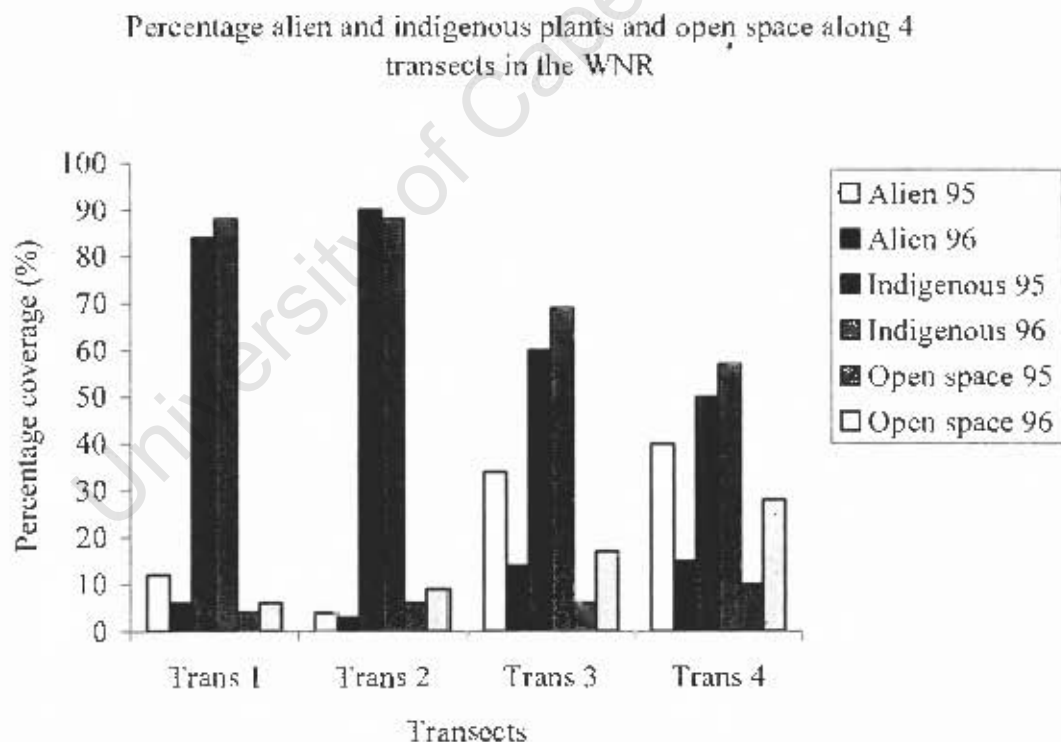
APPENDIX 21. Using the WNR to do the alien plant vegetation audit: Active learning story of Westville Primary who did a long-term school-in-community monitoring study.

The story of Westville Primary using WNR as a resource for a long-term monitoring study

The teacher from Westville Primary, Mr. Tregonning had been one of the most active in the teachers study. I sat down with him at his school in late 1996 and asked him to tell me how he used the WNR.

He explained that during the teacher workshops in 1995, he volunteered to trial a procedure to develop an educational audit to monitor one of the two identified threats to WNR, namely the alien vegetation. Together with other teachers and a core set of 8 pupils from the school's environmental club, he tested a learning programme and a method to carry out the alien vegetation audit along four transects in WNR during June–July 1995, in the school holidays. (These were later refined by teachers – including Mr. Tregonning, in 2001–2002, and both products are shown in Appendix 22).

He indicated that they have also done the pollution audit at their school's plot, but that he has assisted her teachers when using WNR to do the pollution audits. His pupils even assisted high school pupils with doing the pollution audit (see newspaper article below). Not only did they generate a set of data for alien vegetation in 1995, but also continued with monitoring in 1996 (see graph below and photograph on next page). In this way, they could provide an indication of the state of alien vegetation along the four transects even after alien clearing and fire occurred in WNR during late 1995. The length of each transect is: T1=780m; T2=1004m; T3=580m; T4= 916m.



What he had described was evidence of teachers changing their own practice in a meaningful way using a resource such as WNR, during an INSET process. His assistance to other teachers provides evidence that teachers themselves are (with their pupils) key INSET providers.



Photograph of pupils doing alien vegetation audit

ARTICLE 3: The Plainman 5 October 1975



ENVIRONMENTALISTS: Pupils from Westville Primary School escorted Glendale and Portland high schools during a clearing up operation at Wolgat Nature Reserve. Westville teacher Mr Dawood Treginning, kneeling, showed how successfully the local vegetation was propagated after a planned veld fire recently.

Plain schools adopt plots in nature reserve

VARIOUS primary and high schools in Mitchell's Plain have taken up the challenge by Westville Primary School by adopting plots at Wolgat Nature Reserve. MANDY KING tackled some clearing up operation.

PUPILS from both primary and high schools in Mitchell's Plain have adopted plots at the Wolgat Nature Reserve in response to a challenge by Westville Primary School.

Glendale, Portland and Princeton high schools and five Ridge Park, Cassique, Ilugumut and Pro-

goville primary schools have already marked their plots in the reserve.

Westville teacher and Wolgat Nature Reserve working group member, Mr Dawood Treginning, has extended the challenge to extramurals as well.

"The reserve is an excellent resource which can be applied to all high and primary school subjects — including history, geography and even mathematics," said Mr Treginning.

The reserve has tremendous untapped educational possibilities which will be relevant to the pupils, he said.

A core group is cur-

rently setting up a curriculum using Wolgat Nature Reserve as a resource.

In a recent trip to the reserve, pupils from Glendale and Portland high schools were allocated plots.

They held a cleanup campaign and were also shown how well the indigenous vegetation propagated after a recent planned veld fire.

In addition to adopting a plot, Westville Primary School's environmental group also adopted all the indigenous species found in the reserve, including coastal fynbos and strandveld vegetation.

Newspaper article of Westville primary pupils who assisted high school pupils of Portlands High with conducting the pollution audit.

APPENDIX 22. Alien vegetation learning programme developed by teachers for use in WNR. A guide for teachers and an activity sheet for the pupils developed by teachers for use in WNR are also given below.

Activities (what pupils will do)	Resources	Outcomes	Time (No. lessons)
Creating awareness: 1) Video on WNR 2) Understanding: What are alien plants; where do they come from; the species in WNR; their effect on the environment; why is it important to remove them. 3) Introduction to the alien vegetation audit. Methods and tools	* ** ✓ ▲ ■	NS 1,2,3	1 1 1
Field visit into WNR: 1) Pupils conduct the alien transect audit in WNR 2) Pupils ensure that all parts of the audit activity sheet is filled in	■ ☺	NS 1,2	3 (in one 2 ¼ hour session in WNR)
Consolidate and report findings: 1) In the classroom: - finalize calculations and compile graphs 2) Presentation of audit findings to rest of class 3) Compilation of landscape picture and decide upon plan of action to remove alien plants from WNR	☺ ☺ ☺	M 3 SS (Geo) 3 SS (Geo) 3	2 1 2

Key to the resources:

- * = WNR video
- ** = Enviro-facts sheets
- ✓ = live material
- ▲ = Environmental impacts of alien plants booklet
- = longitudinal transect kit- see teacher's guide
- ☺ = audit activity sheet – see teachers guide

Key to the outcomes:

- NS = Natural Sciences learning area
- M = Mathematics learning area
- SS (Geo) = Social Sciences learning area (Geography component)

Grade 6- For the Educator

LONGITUDINAL TRANSECT AUDIT

	Learning Area	Learning Outcome	Assessment standard
Main focus	Natural Science	2	1
Cross-curricular links	Mathematics	3	2
	Social Science: Geo	3	4
Critical Outcomes 1,2,4,5,6			

Learners will be able to:

Work effectively in a group; Conduct a transect audit in an invaded area of WNR; During the audit, observe, identify and collect information about the extent of infestation of alien plants along the transect; Use the information gathered to calculate the % weed versus indigenous versus open space and draw a bar graph to represent their findings; Present their group reports to the class giving the reasons why the weeds should be removed; Decide with other learners on a plan of action for the removal of the weeds; Participate in electing a representative to present the report to the staff and governing body; Participate in planning a hack attack to improve a degraded WNR. Plan to participate in developing a policy for a long-term hack attack programme.

1) What is an alien vegetation audit?

It is a cross-curricular active learning programme. It involves doing a alien plant transect audit in the local environment. It involves fieldwork with groups of learners. During the audit, they collect information about the extent of infestation of weeds along the transect. They will be able to calculate the % aliens versus indigenous versus open space and draw a bar graph to represent their findings.

2) Aim:

To introduce learners to the skill of auditing alien plants in WNR and gain an idea of the extent of their invasion.

3) Apparatus:

Clipboard; Longitudinal transect kit – containing the weedbuster transect audit activity sheet; Calculator; Extracts of local alien plants from “Declared weeds and alien invader plants in South Africa” book to identify alien plants; 50m tape; a meter stick

4) Methodology:

Part 1: -Awareness programme in the classroom:

Prior to the method, provide information and understanding to learners about alien plants in WNR

Method: Explain to pupils that the whole audit process, and indicate that it will entail 10 steps.

Part 2: Fieldwork programme in the field:

Step 1: Form groups of 5 learners each and assign a role to each learner in each group. Three fieldworkers, an estimator and a scribe. Explain clearly what is expected from the groups – each group will have to audit only one longitudinal transect. Thoroughly go through the audit procedure as well as the apparatus and activity sheet.
Step 2: Place the first pupil at point zero of the transect. Using the tape, the second pupil proceeds to point 50m along the transect. Pupils will face in the same direction (north to south). The third pupil proceeds for another 50m to point 100m from point zero. **Step 3:** Two learners will walk forward alongside either side of the tape. The one will identify alien plants using the guide and accurately estimate the occupation of weeds, indigenous and open space (from the calibration of the tape) as found on 0.5m on either side of the tape. The meter stick will help keeping to 0.5m from either side. The last learner will scribe the result onto the activity sheet. This process will be repeated by each group for every 100m, until transect is completed. **Step 4:** Following the survey, members of each group meet to ensure that activity sheet is complete.

Part 3: Back in the classroom:

Step 5: The groups are given a chance to finalize all calculations and compile their bar graphs

Step 6: Groups present transect audit findings with reasons why the weeds should be removed.

Step 7: With teacher as facilitator, compilation of the whole landscape picture and the formulation of a plan of action by whole class to present to the staff and governing body is to take place.

Step 8: Discussion with other learners on a plan of action for the removal of the weeds

Step 9: Electing a representative to present the report to the staff and governing body

Step 10: In conjunction with the WNR management, and “Friends of WNR”, plan a hack attack and discuss a policy to improve the poor and degraded environment of WNR.

LONGITUDINAL TRANSECT AUDIT ACTIVITY SHEET -Illustrative example

Group Number: _____

Outcomes Required

By the time your group has finished this activity sheet, you should have completed the following steps

Part 1: In the classroom:

Make sure you all understand alien plants and WNR.

Part 2: Fieldwork in WNR

Step 1: Form groups of about 5 learners understand each one's role. Gain a thorough understanding of the audit procedure as well as the apparatus and activity sheet.

Steps 2-4: Conduct a transect audit along the transect allocated to your group.

Step 5: Use the information gathered to calculate the % weed versus indigenous versus open space.

Draw a bar graph to represent the findings

Step 6: Present a group report to the class giving reasons why weeds should be removed

Step 7: Compile landscape picture with teacher as facilitator.

Step 8: Decide with other learners on a plan of action for the removal of the weeds

Step 9: Participate in electing a representative to present the report to the staff and governing body

Step 10: Plan hack attack and discuss policy to improve state of WNR environment

Step 1:: Form groups: Following the teachers explanation of the audit, discuss the way your group will do the survey. Decide your roles (eg. Scribe, estimator, fieldworkers). Complete the table below.

Name	Role	Responsibility
1)		
2)		
3)		
4)		
5)		

Step 2: On the field trip : Conduct the alien plant audit along your transect. Complete the table below.

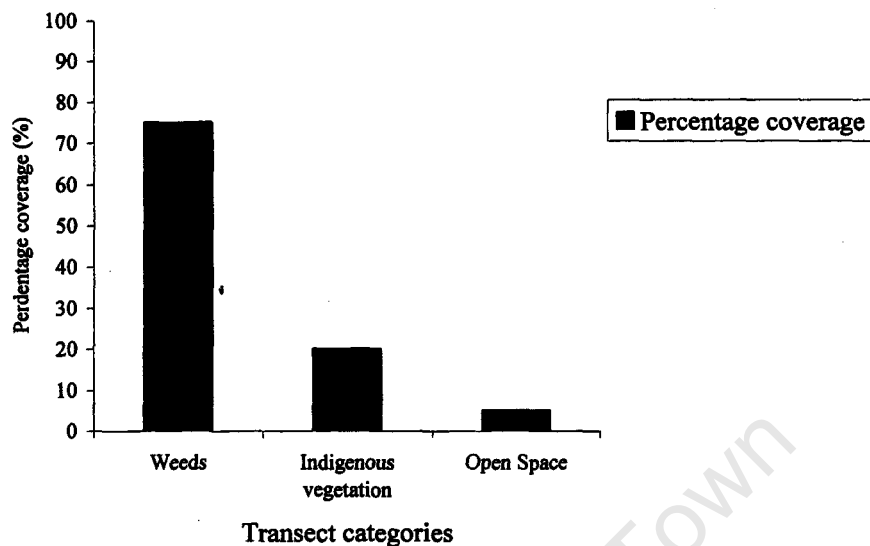
Indig	Weed	Open	Distance	Height Categ.	Description
0 m			Start		
	3 m		3 -w	1.5 m	Thick bush
5 m			2 - I	0.5 m	Low shrubs
		6	1 - o	0 m	Sand
	10 m		4 - w	1.4 m	Sparse bush
12 m			2 - I	0.4 m	Arum lilies
	20 m		8 - w	1.8 m	Thick bush

Step 3&4: The extent of infestation of alien plants along the transect. Complete the table below from the results obtained in step 2.

Category	Extent of infestation	% infestation
Weeds	15 m	75
Indigenous vegetation	4 m	20
Open space	1 m	5

Step 5: Draw a bar graph to represent the findings of your group

Percentage coverage of weeds, indigenous vegetation and open space along a transect in WNR



Step 6

After your presentation, list the reasons why alien plants should be removed from WNR.

Step 7

After compiling the landscape picture of alien plants in WNR, what suggestions does group make to remove alien plants from WNR?

Step 8-9: After your discussion, what s the name of the learner who will take forward class report to the staff and governing body

Step 10: What is the date of a suggested Hack Attack in WNR?

After your discussion on what is a policy, what is your group's contribution to such a policy?

Date: _____

Policy contributions:

APPENDIX 23. Illustrative example of how teachers identified relevant examples to use in the Primary school Natural Science syllabus in the Senior Primary/ Intermediate phase of Learning, when using WNR.

Senior Primary/ Intermediate Phase			
Theme	Grade	Activity when using WNR	Nature /Type of resource material identified
1. Air	Grade 4	Air movement causing pollution on a windy day	Worksheet to show release and capture of plastics
2. Water		How plants in WNR save water	Worksheet to look at plant adaptations
3. Importance of air and water for living organisms		What happens if plants do not get air or water	Worksheet to look at plant growth in every season
4. Plants and humankind		<i>Beneficial and harmful plants e.g. medicinal and alien plants</i>	Worksheet to look at two types of plants
5. Animals and humankind		Beneficial and harmful animals e.g. birds and rodents	Worksheet to look at two types of animals
1. Air	Grade 5	<i>Air movement on a windy day -measure pollution impact</i>	Worksheet to measure distance of plastic movement due to air
2. Water		Plants in WNR save water. Plants that do not save water How can we save water	Worksheet to look at plant adaptations and how we can adapt to save water
3. Heating		How does heat change in plant habitats	Worksheet to measure heat change in plant protected and exposed habitats
4. Practical observation of 1,2, and 3 in seed germination		<i>Investigate seed germination e.g. of Acacia cyclops after a veld burn in WNR</i>	Worksheet to identify and count seedlings after burn in a 1 mX1 m quadrat
5. Reproduction, growth and development of plants		Observation of plant growth and reproduction in WNR	Worksheet to look at one plant species e.g. bietou
6. Reproduction, growth and development of animals		Observation of animal growth and reproduction	Worksheet to look at one animal species e.g. the butterfly
1. Air	Grade 6	Air movement – predicting movement of different matter in WNR depending on the wind	Worksheet to look at trends in air movement per season
2. Water		How plants in WNR save water Water saving audits e.g. measuring leaks	Worksheet to look at how to improve water conservation efforts
3. Plants as primary food source for humankind		Developing water-wise food gardens	Using water-wise species and cultivation methods
4. Importance of conservation		<i>Discussing the threats to the conservation of WNR e.g. alien vegetation</i>	Worksheet with key discussion issues
5. Dangers of pollution in the air, water and land		<i>Pollution investigation in WNR- - focus on land pollution</i>	Pollution worksheets